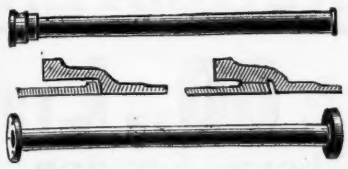
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVIII. No. 1754.] LONDON, DECEMBER 22, 1896. [48TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



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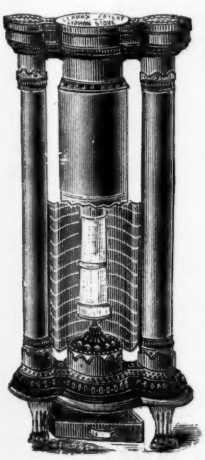

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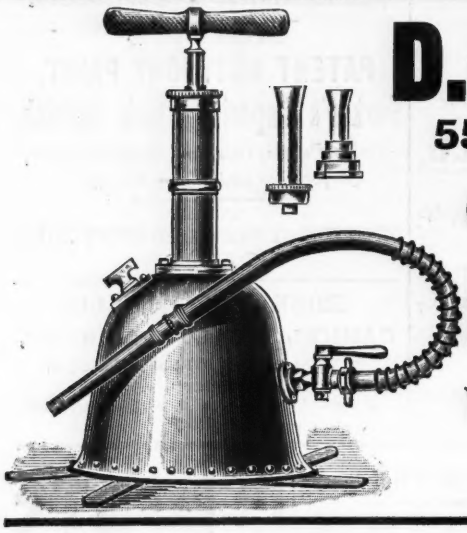

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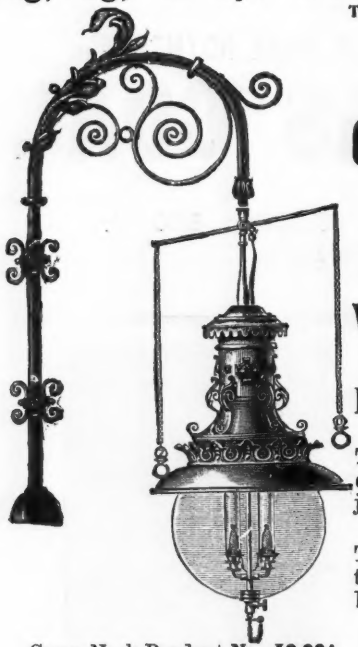

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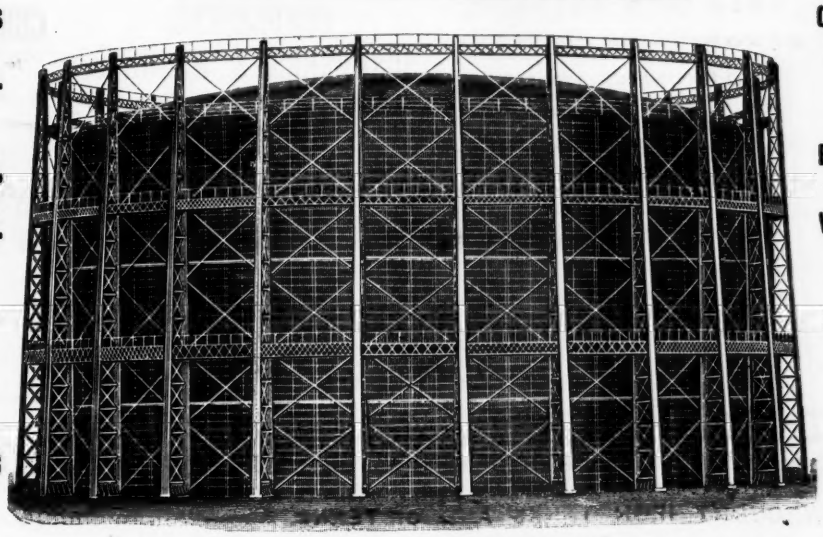

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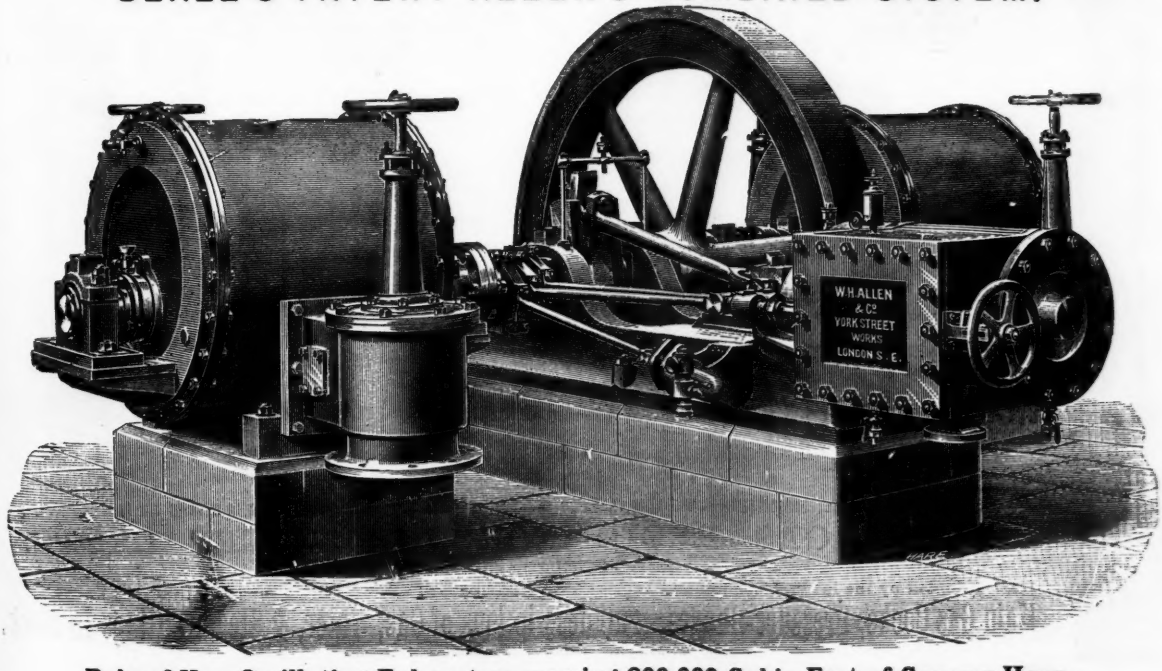

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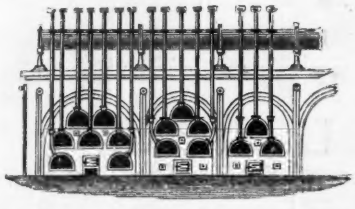

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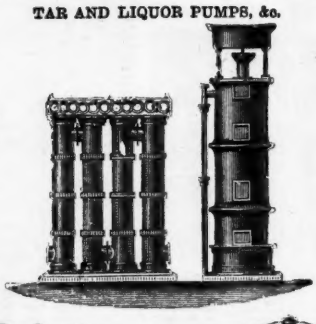

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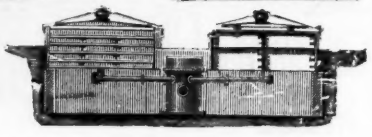

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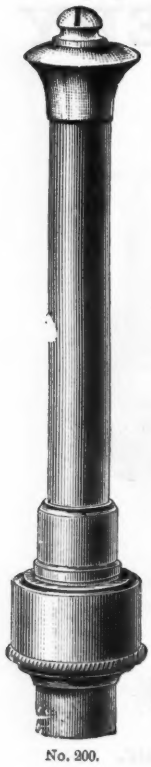

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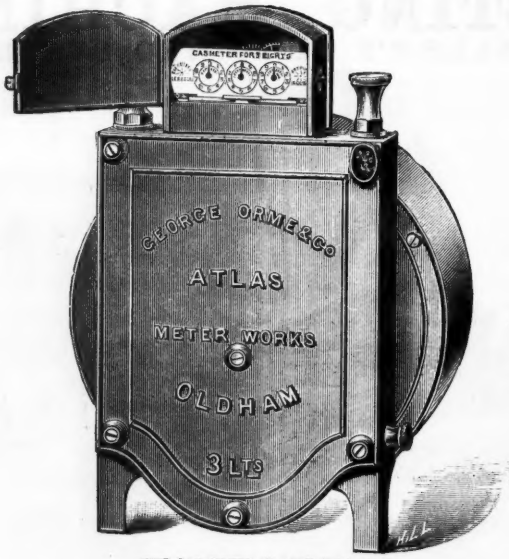
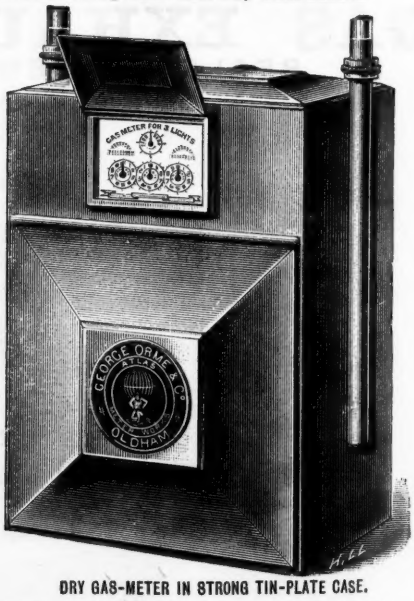


WET GAS-METER IN CAST-IRON CASE.



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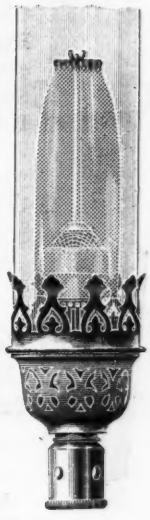

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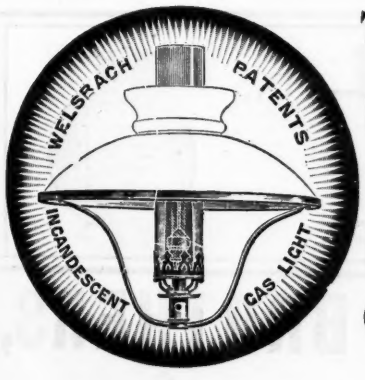

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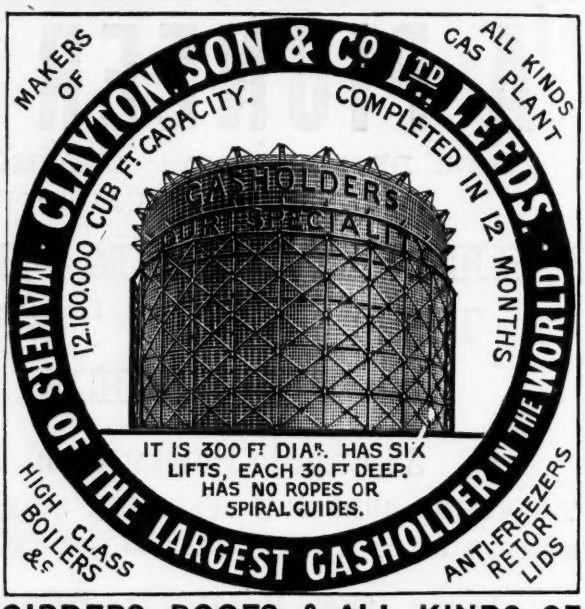
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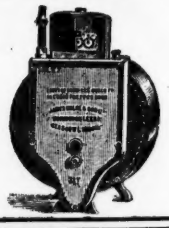

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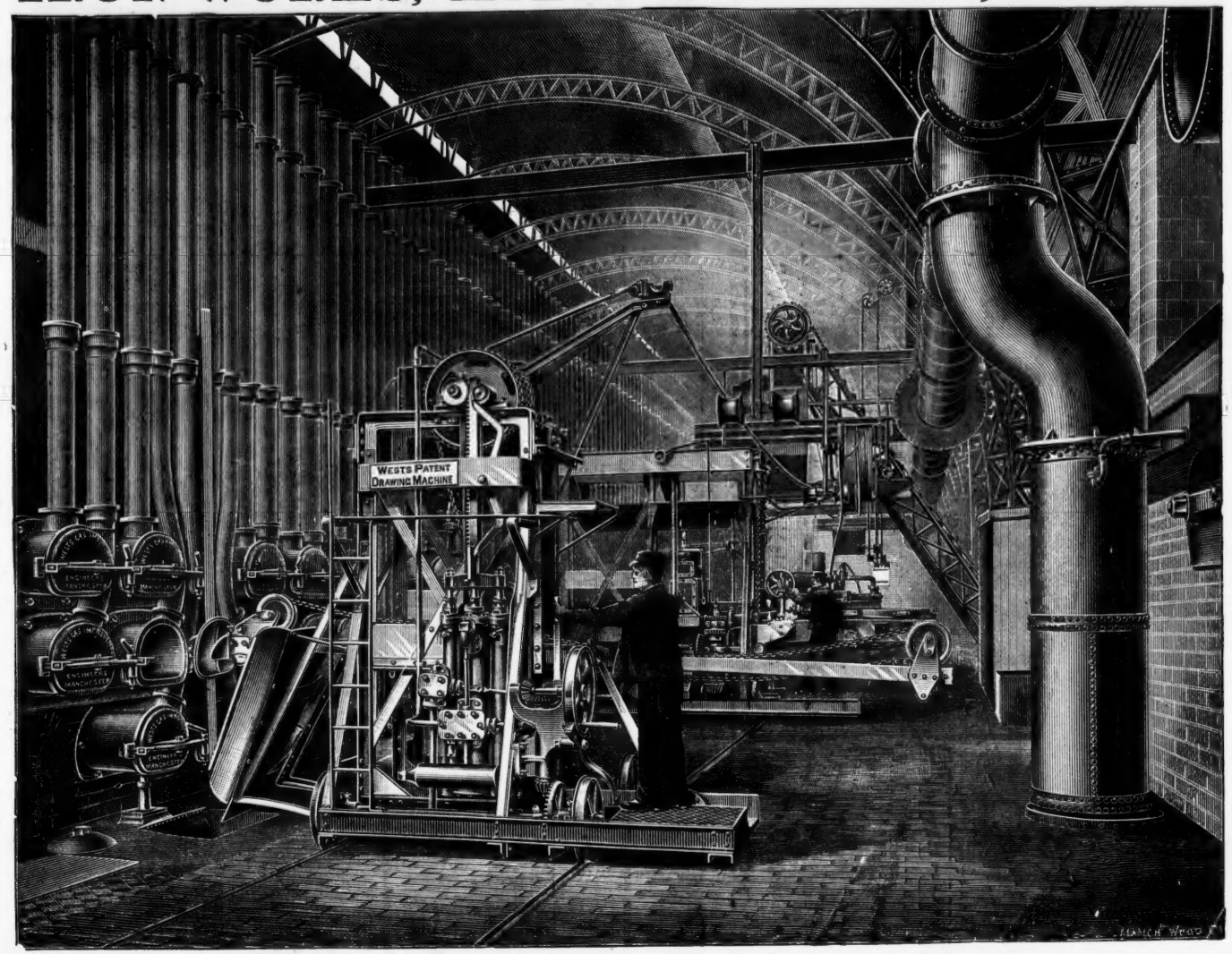

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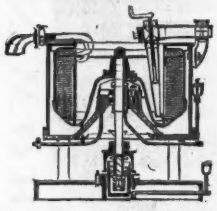

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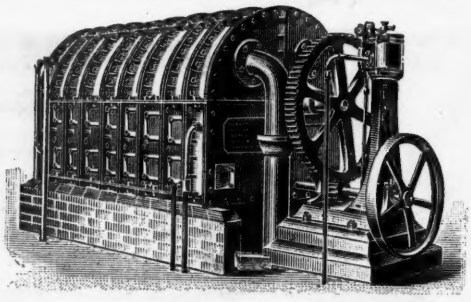

OVER **530** MACHINES

In use and in course of Construction.

They extract all the Ammonia and a large proportion of Carbonic Acid and Sulphuretted Hydrogen.

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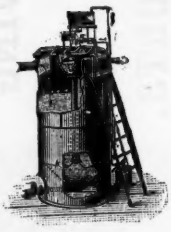

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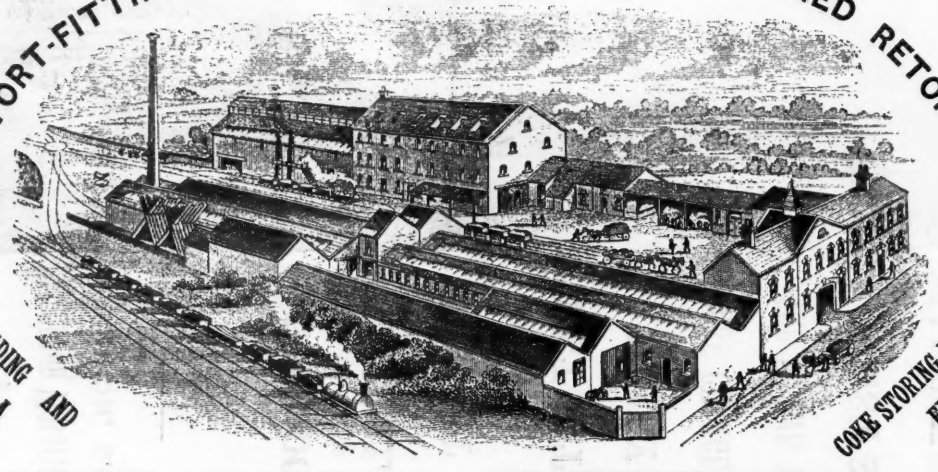

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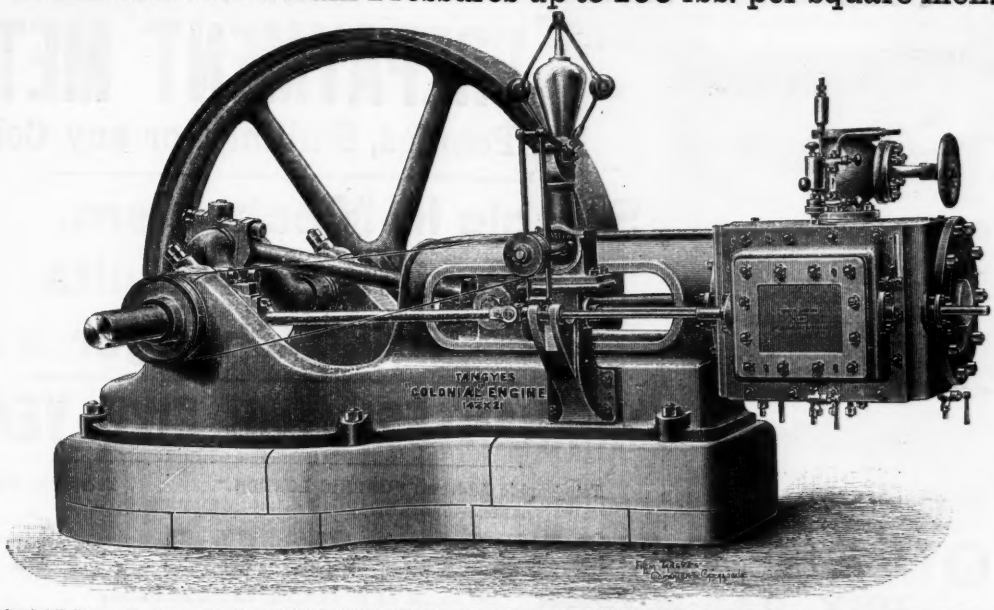
Constructed for Steam Pressures up to 100 lbs. per square inch.



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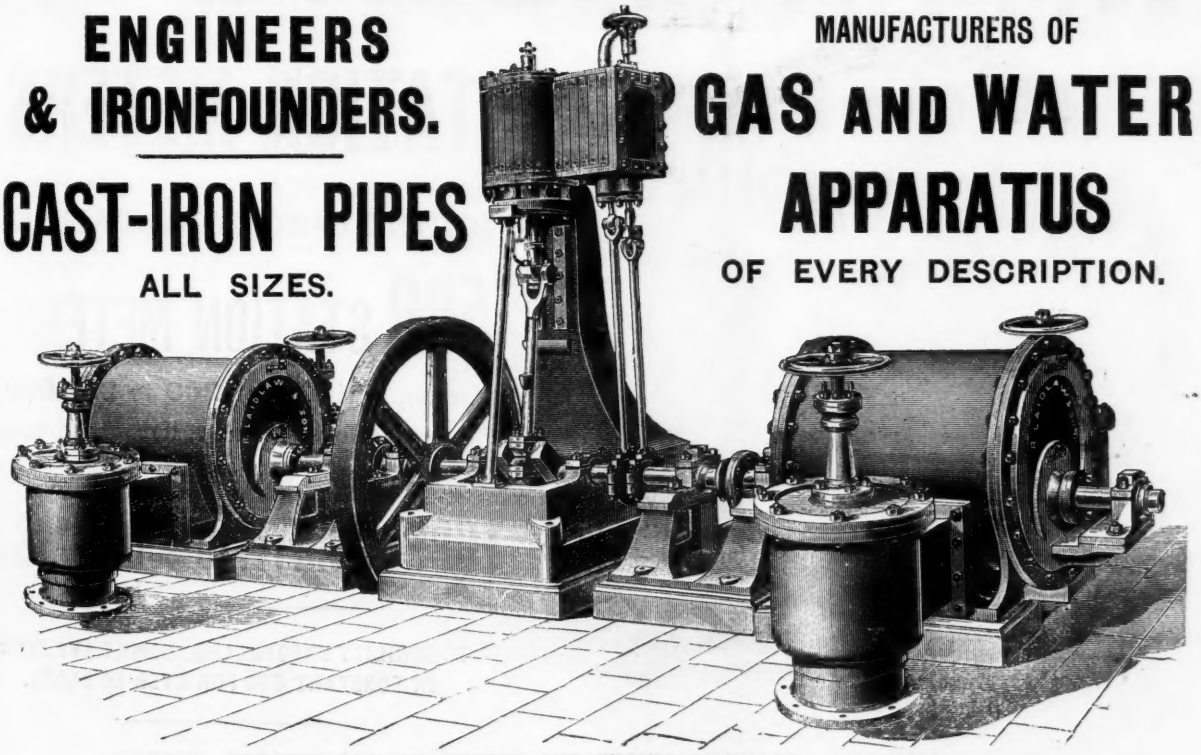
ALL SIZES.



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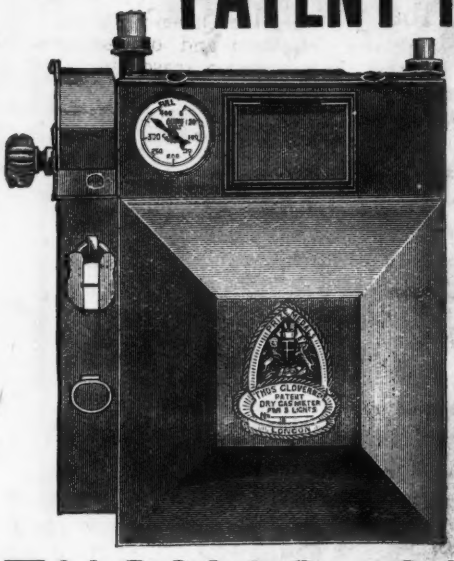

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Next Employers' Liability Bill.

THE subject of prospective legislation with respect to employers' liability and compensation to workmen for injuries sustained while pursuing their employment, was discussed at some length in last Saturday's "Times." The subject was mentioned in the Queen's Speech last session; and the Home Secretary and others, as our contemporary remarks, have raised a reasonable expectation that it will engage the early attention of the Government. It is not too soon for those who will be practically affected by any change of the law of employers' liability to consider the probable character of such action as Parliament may be induced to take in this regard. As "The Times" Correspondent puts it, the present law does not recognize any general claim to compensation by workmen, but makes the employer liable only in case of his own negligence or that of persons placed by him in authority over his workpeople. The law is in principle punitive. During the last Administration, Mr. Asquith, as Home Secretary, introduced a Bill professedly on the lines of the existing law, but extending the employer's liability to cover acts of fellow-workmen of the injured. There was no limit of time for bringing claims, the amount of which was left absolutely at the discretion of the claimant. Several cogent objections were raised to this Bill, chiefly as to its interference with the doctrine of common employment and disallowing contracting out. The House of Lords forced the latter question to an issue by inserting a clause in the Bill permitting the employer to contract out when he could show that a voluntary arrangement had been made between him and his workpeople for securing compensation to them for all injuries out of a common insurance fund to which the employer had contributed at least a half. It is history how the Government of the day refused to accept this amendment, and preferred to drop the Bill.

The present Government are pledged to legislate on the subject; and it is evident that they can do so in different ways. In the first place, they can introduce a Bill identical in all essentials with Mr. Asquith's, but permitting contracting out under certain conditions. Such a measure could be passed; but, as "The Times" Correspondent points out, it would have the disadvantage of offering a positive invitation to the Opposition to repeal the contracting-out clause on the very first opportunity. All the forces of political "Labour" would be concentrated upon this repeal movement. The alternative course to this is to try for such an amendment of the law as would be accepted by all reasonable parties as possessing the elements of finality. A scheme of legislation of this kind has been sketched out by Sir Arthur Forwood, and has been approved by Mr. Chamberlain and others, upon the wide basis of recognizing the workman's right to compensation for all injuries sustained, otherwise than by his own fault, in the ordinary course of his employment. Accordingly, it has been proposed that such reasonable compensation, after a scheduled rate, should be recoverable by workpeople from employers by a simple method of procedure involving a time limit. This is merely to extend to all employment, with certain exceptions, the benefit now enjoyed by employees from mutual accident funds. A Bill to so amend the law could be drafted; but the work would have to be done very carefully. If this were the whole scheme of such legislation, it would, however, be open to several serious objections. The Trade Union interest would, of course, be dead against it on general principles. But it may be taken for granted that the present Parliament is not likely to favourably entertain opposition directed either to keep workpeople discontented with their employers, or to force them into trade societies.

We may take it that while Parliament would look out pretty sharply for the cloven hoof of Trade Unionism under the robe of any amendment to a Government Employers' Liability Bill, every honest criticism of such a measure would be welcomed and duly weighed. A leading article of "The Times," discussing the suggestion that this sketch by Sir Arthur Forwood constitutes the only feasible alteration to Mr. Asquith's Bill with a contracting-out clause added, observes truly that there is not much more hope of finality in the one than about the other. Once make the employer responsible for every injury sustained by his workpeople not due to their own negligence, and

though there may be finality about this extension of principle, there can be none in any limitations placed round it in the first place. It is not to be believed, moreover, that Parliament would pass a law ostensibly to extend the workman's right to compensation, while really enabling an employer to escape from any liability at present attaching to his status. This liability in the case of negligence is unlimited. The great thing to be borne in mind, when considering this question, is that, as the Trade Unions have declared and everybody must agree, the risks of work should be reduced and accidents prevented. The main object of all legislation about employers' liability and workmen's compensation should be to make the former operative in preventing as far as possible the necessity for assessing or recovering the latter. So far as the workman's objection to contracting out and insurance is motived by the feeling that these courses tend to relieve the employer of his natural responsibility for the existence of safe conditions of work, it is to be respected.

But it is necessary to look at the question from all sides, and not merely with reference to the case of the large employer or the small master—the employment where a mutual accident fund is in existence, or that in which the employer can barely pay his people's wages, to say nothing about compensating any of them in the event of injury. There are already enormous forces in operation tending to concentrate employment in large firms; and it is desirable to think seriously over any project of legislation that might ever so indirectly tend to favour these influences—not that the result in question is necessarily bad; it is something to which legislation should as far as possible be neutral. The power of large firms to impose conditions of employment other than that of doing the work paid for, is something which is quite extra-legal; and it is a thing that Parliament ought to watch over very carefully. It does not come with a good grace from Trade Unions, which aim at supplementing what they call the tyranny of employers with a harsher tyranny of their own; but it is open for statesmen to argue that all supplementary conditions of employment are at best necessary evils. This is a large subject, however, and not to be entered upon at the close of an article upon another and more limited question. It should be noted that "The Times" invites correspondence with a view to the evolution of "some plan to which the "majority, both of employers and workmen, might give "willing assent." It is quite likely, however, that the British public will not take the trouble to help the Government in this way; reserving the right to grumble with the official scheme when it appears.

The Experiences of the Continental Union Gas Company.

The ordinary general meeting of the Continental Union Gas Company, which will be found reported in another column, is interesting for the information given in the Directors' report and the speech of the Chairman, Mr. Arthur Lucas, concerning the condition of the gas industry on the Continent and the administrative methods of certain European Governments. It appears that the consumption of gas both for public and private lighting in the towns served by the Company is increasing at a rapid rate, notwithstanding the competition of electricity—in one instance supplied by the Company's own installation. A Gas Company doing business in a Continental town is expected to do all sorts of things to please the Municipality and gratify the public. It is difficult for people brought up in the Free Trade atmosphere of England to realize the extent of the Continental predilection for indirect taxation, and for getting things done by deputy. It is necessary, however, to bear this in mind whenever, as occasionally happens, English Municipalities are invited to consider how certain public services are done in selected Continental cities. A case in point occurs in connection with the conflict between the Corporation of Bristol and the local Tramways Company over the question of who shall supply the electricity for extending mechanical traction. Mr. W. H. Preece has bidden the Bristol Corporation look at Rome, and see how an electric lighting station supports a tramway service. As a newspaper critic has pointed out, this is only a particular illustration of the confirmed Continental trick of making one thing that appears to be able to afford it pay for another. Thus the Continental Union Gas Company not only have to supply electric lighting (at a loss) to please the good folks of Messina, but when the Government of Italy wants more money—the chronic state of this distracted nation—a fresh tax is laid on, and the Company are made to pay it in the first place, and left to collect the money afterwards from the consumers. The general idea of many needy Continental Administrations, national and municipal, is that such a Gas Company as the Continental Union has plenty of cash, collected in strong boxes which must be tapped somehow. The authorities never seem to think that somebody has to find the money, and that these contributories already pay their share of taxation. The only thing cared for by the Governments is to get the money how they can—preferably indirectly. Meanwhile, the consumers naturally clamour for cheap gas; and the Gas Companies are debarred from responding to this legitimate demand by the fact that, in their own despite, they are made tax collectors for the State or the town—often for both. The concession system is bad enough at its best; but when it is worked as many Continental Municipalities work it in respect to gas supply, the marvel is that the gas industry lives under such treatment. Everything else, of course, is served in the same way. Gas is more elastic than some of its rivals; so that the industry not only lives, but grows and develops even under these onerous conditions.

The Strike at Plymouth.

The National Union of Gas Workers and General Labourers of Great Britain has again been pursuing its peculiar methods of persuasion at Plymouth. It is not the first time that Plymouth has experienced its delicate attentions; there have been threatenings and strikes at the gas-works there on former occasions. One of these occurrences was rendered memorable a year or two ago by the mysterious appearance of two or three large stones wedged in tightly between the side of a gasholder and the wall of the tank, and by an interference with one of the governors which, but for its timely discovery, would have plunged half the town in darkness. These events are naturally recalled by the circumstances of the latest manifestation of discontent at Plymouth. It is true that the officials of the Union expressed strong disapproval of those "accidents," just as they disavow responsibility for the remarkable manner in which the coal elevators refused to perform their functions after the men struck work on Friday night. We are bound to accept these denials; indeed, it is impossible to believe that the officials would be so wanting in the instinct of self-preservation as to counsel, or even openly approve of, such acts of unwisdom. The curious thing is that the events are coincident with manifestations of Union activity. Apart from the incident of the elevators, the strike of Friday night last is not without its lesson. So long ago as the beginning of November, Mr. Brabham, the District Secretary of the Union, asked the Directors of the Company to receive him as a member of a deputation to talk over some alleged grievances of the workmen. The answer was a polite but definite refusal to have the interference of outsiders in a matter obviously concerning only the Company and their employees. The Company were prepared to treat with the men, and listen to grievances; but they did not need, and would not have, the intervention of the Union or any third party. Now it was obviously what Mr. Brabham did not want, to let the Directors and men come together. The idea was to force the Company to recognize the Union. He kept urging this point for a month; and when there seemed a prospect of the men's grievances being adjusted without this being conceded, there came a strike. Here again Mr. Brabham was in a position to plead that he was not responsible. The men, it is alleged, came out spontaneously, without orders, and with the implied if not expressed disapproval of the Union. It may be so. But the time for the strike was certainly chosen with remarkable skill; and it is not the least singular feature of this very extraordinary business that the strikers' one and only condition precedent to returning to work was that the Directors should receive the Trade Union Secretary. There are some things in the history of this latest upheaval in the gas industry which give it a family likeness to similar disturbances; and these are best understood by those who have had opportunity to study the modern Trade Union official.

The Gas Undertakings Returns.

Only just before going to press this week, we received the Board of Trade returns relating to the authorized gas undertakings of the United Kingdom, which are issued a

fortnight earlier than the last publication in this most useful series of parliamentary papers. There has been no time to make an examination of the returns; and so we must content ourselves with a brief statement of the principal totals. The number of undertakings included in both returns, as belonging to Companies and Local Authorities, is 632. The gross amount of capital sanctioned for all these undertakings is £84,410,867, of which £70,819,742 has been raised. By the employment of this money in the supply of gas, a gross revenue of £19,461,147 was earned for the period covered by the returns, at an expenditure of £14,373,288. The weight of coal carbonized was augmented again to 11,937,446 tons, from which roughly 121,421¾ million cubic feet of gas were made. Of this 111,443¾ million cubic feet were sold; being distributed through 23,857 miles of mains to 2,659,771 consumers and 526,888 public lamps. This statement, subject to correction for imperfect returns under one or two headings, represents the extent and volume of the statutory gas industry of the United Kingdom, which have increased by 50 per cent. during the fourteen years covered by these annual returns. The statistics are fairly complete now; but it may be noticed that a little disturbance of the column appropriated to meter-rents has been caused in some instances by the innovation of prepayment meters. As a rule, there is no mention of this variety of meters; and it would be an advantage if some rule were agreed upon as to the manner in which they should come into the returns, if at all.

Continuous Tramway Metals.

The progress of mechanical science is not more remarkable for anything than for entailing upon us the constant reconsideration of many of our most cherished conventions. Over and over again devices and processes are brought forward and shown to be advantageous, as to which the technical mind, duly fortified by text-books, would have no hesitation in declaring off-hand that "there "is nothing in it." The technical mind is very often—even generally—justified. But there are instances when it has to admit its error. A remarkable illustration of this is afforded by what is actually being done in the United States with a view to the improvement of street tramway working, and the prevention of underground electrolysis, by making the rails continuous. It is common knowledge that the overhead trolley-wire system of electrical tramway working has practically taken possession of the towns of the United States; and it is no secret that this invasion has been attended with considerable loss and annoyance to the owners of gas and water pipes in the thoroughfares traversed by the tramways. In the United States, the last comer into town appears to be allowed to do pretty much as he likes with everything he finds ready established. But the electrolysis of gas and water mains and services was recognized to be a bye-product of electric tramway working that could not be endured. The mischief was due to vagrant electricity escaping from the tramrails which constituted the return circuit; and it was obvious that the first thing to be done by way of prevention was to keep the current to the rails. The metals were able to carry the current well enough themselves; but, unfortunately, the gaps between the successive lengths proved an obstacle to its passage which could only be obviated by making special bonding at these points, at considerable expense. The appearance in a practical shape of an electrical welding apparatus, capable of fusing together *in situ* the two ends of adjacent pieces of railway metal, suggested the attempt to make the rails continuous; and this has been done in many instances with sufficient success to warrant further perseverance in the application of this cure for the electrical and other drawbacks of the old-fashioned discontinuous track. Of course, the question of expansion and contraction instantly suggests itself in this connection. If railway metals can be made continuous, what becomes of the traditional necessity for leaving an eighth of an inch clearance between every length of metal and the next one? The answer is that, while the physical phenomena of the expansion and contraction of metals, in consequence of alterations of temperature, remain unchanged, the supposed necessity for providing for them in this particular way does not hold good. There is another way of doing it, which is to make the rail strong enough to bear the internal stress that must come upon it if free longitudinal expansion and contraction are denied to it. This can be done, even for a considerable range of temperature; and, of course, the smaller the range of temperature, the less internal strain there is upon a continuous rail. Something of this obtains in the laying of those same gas and water mains and services which have proved instrumental in provoking the evolution of the continuous tramway rail. When buried at such a comfortable depth that seasonal alterations of temperature cannot reach them, gas and water mains and services are stauncher and last longer than those which are exposed to the vicissitudes of the weather. Lead joints will give and take; but not so screwed joints in service-pipes, which are sorely tried by large variations of temperature, and for this reason leak considerably in course of time.

WATER AND SANITARY AFFAIRS.

On Mr. W. J. Dibdin, the Chemist of the London County Council, has devolved the task, not only of conducting an analytical and bacteriological investigation into the character of the London Water Supply, but of replying to the criticisms which have appeared in "The Times" and the "British Review" on the reports by himself and others concerning this matter. Mr. Dibdin's reply was published in "The Times" on Friday last; and it has, of course, elicited further criticism. Mr. Dibdin mainly concerns himself in defending his own report, which is certainly better capable of defence than that by Dr. Klein, whatever may be said as to the statements by Dr. Dupré and Dr. Stevenson. But "The Times," in a leading article, contends that Mr. Dibdin is at least "editorially respon-"sible" for the entire group of reports. The Council's Chemist is, therefore, in a position at once dignified and onerous. But he escapes a large amount of trouble in a literary sense, by leaving Dr. Klein and Dr. Dupré to enjoy the benefit of the letters which they have themselves addressed to "The Times." What is stated in these epistles he has no occasion to repeat. Discussing that which Mr. Dibdin now advances, the leading journal contends that no comparison is possible "between samples taken from the "mains, no matter with what precautions, and samples "taken from the filter wells." The fact is recognized that the better the filtration, the more rapidly will the multiplication of bacteria go on through the pipes, and "The "Times" declares that "the whole elaborate series of ex-"periments upon water drawn from stand-pipes are utterly "worthless and irrelevant" for the purposes which they are intended to serve. Even Mr. Dibdin and Dr. Klein are at variance in their results; and it is remarked concerning these two authorities, that, "until they can settle things "between them, no man need give himself a moment's "uneasiness about either." So the matter stands; and there is little doubt the public are disposed by this time to look upon the microbe in London water as a species of "bogey," of which they have heard quite enough during the past few weeks, and whose existence is of no particular consequence.

As might be expected, all the experts are not so indifferent to bacteriological results as the ordinary water consumer. Mr. Crookes and Professor Dewar, in their usual report on the London Water Supply for November, describe the method by which they have conducted their bacterial examination of the London waters since they commenced this work ten years ago. Contrasting their procedure with the description given of it by Dr. Klein, the two Chemists say: "It will scarcely be believed that "the above-quoted assertions, which Dr. Klein has made "for the purpose of throwing discredit on our bacterio-"logical results, have no foundation in fact." Dr. Edward Frankland, in his report for the past month, is careful to show that his examination for bacteria is not effected until after incubation has been going on for a period extending from three to seven days. This disposes of Dr. Klein's statement, that the colonies were counted "after forty-eight "hours, when they have barely commenced to grow." Dr. Frankland's examination shows the singular result that, whereas the Kent Company's "New" well at Deptford yielded 45 microbes per cubic centimetre, seven out of the fourteen samples of river water produced no more than from 12 to 36 microbes in the same standard. The lowest number occurred in the general filter well of the Chelsea

Company; the reduction of the microbes as compared with the raw river water being 99·86 per cent. Mr. Crookes and Professor Dewar report a still smaller number of microbes in some cases; the East London supply from the Company's clear-water well having only six colonies per cubic centimetre.

There is a startling statement in the address from the chair by Sir H. E. Knight, delivered at the half-yearly meeting of the Southwark and Vauxhall Company last week. We have been accustomed to hear of the extraordinary growth of the rates and taxes paid by the London Water Companies. But in the case before us this burden has been increased threefold during the last sixteen years—rising from £8600 in 1880, to £25,700 in 1896. Perhaps if the other Companies will look back over the same period, they will find a corresponding increase. At the meeting of the Chelsea Company on Thursday, Sir W. H. Wyatt stated that they were now paying £16,000 a year in rates alone. The process unfortunately is still going on, though it may be cited as another proof of what Sir John Lubbock has said, as to "the great share which the "ratepayers already possess in the Water Companies." Law and parliamentary expenses form another part of the load the Companies have to bear; and the eight Purchase Bills which the County Council are bringing forward are a continuance and an aggravation of this protracted evil. The Southwark and Vauxhall Company have the additional grievance of incurring a heavy expense to no purpose in failing to get their Bill of last session through Parliament. The great frost of some time back was an exceptional visitation, and cost this Company more than £35,000. Sir H. E. Knight was explicit with regard to the Metropolitan Counties Water Board Bill, and declared how they all felt disappointed that it did not pass farther than the House of Lords. They had hailed this measure as likely to lead to a satisfactory settlement of the water question in some way, instead of their being left to be harassed by the London County Council. That the Council would carry their present Purchase Bills was not expected by either Sir H. E. Knight or Sir W. H. Wyatt. That the Government will again take the matter in hand, is a point on which the Companies may entertain considerable hope. Assuredly it is only in this way that the question can be settled, unless the Companies combine to do something themselves.

Mr. E. T. Hooley and the Incandescent Gas-Light Company.—The papers last Thursday contained authoritative statements to the effect that the negotiations for the purchase of the undertaking of the Incandescent Gas-Light Company, Limited, by Mr. E. T. Hooley, to which reference was made in the "JOURNAL" for the 15th inst., had fallen through.

Acetylene Regulations in Paris.—According to some provisional regulations lately issued by the Prefect of Police in Paris, manufactories of carbide of calcium and of acetylene compressed to more than 1½ atmospheres, or liquefied, are to be placed in the first class of dangerous buildings. Manufactories of acetylene gas not compressed, or compressed to less than 1½ atmospheres, if for public use, are to be in the first class; if for private use, in the third class.

"Manual of Electrical Undertakings, 1896."—Under this title, Messrs. P. S. King and Son, of King Street, Westminster, have just published a work which promises to occupy a useful place among technical books of reference. The contents have been compiled under the direction of Mr. E. Garcke, M.Inst.E.E., F.S.S.; and it may be said that, on the whole, they furnish in a compact form a great deal of information. The publishers claim that all the data have been derived from official sources, and have been verified, for the most part, by responsible officers of the undertakings concerned. The bulk of the book (pp. 16-376) consists of the accounts and other particulars of electrical undertakings. These are followed by lists of the Provisional Orders and Licenses granted under the Electric Lighting Acts, 1882-1888; the electrical railways, and the tramways on which the use of mechanical power has been authorized; the electrical companies registered each year since 1856; and a directory of the officials of electrical undertakings. It is explained in the preface that no attempt has been made, by alterations of the official figures, to reduce the accounts to a common plane; but it is believed that the compilation will nevertheless afford all necessary facilities for comparison. As this is the first year of publication of the "Manual" (which it is proposed to issue annually), it would be too much to say that it is not susceptible of improvement. As it stands, however, it may be recommended as presenting a number of financial particulars concerning an important industry, in which already upwards of £50,000,000 of capital has been invested.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1249.)

BUSINESS in the Stock Exchange during the past week was quiet; and the general tendency all round was dull. The quietude was only natural; and it becomes more and more pronounced as the holidays get nearer. The dulness was due partly to the quiet, and partly to special causes. The gilt-edged division was affected by the steady hardening of the Money Market; and Consols fell from 111¾ on Monday to 110¼ on Saturday. But it was the same pretty well all round. Rails of all sorts, especially American, were quite depressed; and in the Foreign Market, Spanish affairs set up a disagreeable tone. Therefore, prices throughout the list show a marked fall. The Money Market was very firm; but the 4 per cent. rate was good enough, and will see the old year out. Business in the Gas Market was, on the whole, decidedly active, though somewhat fitful and variable from day to day; and it was to a very large extent confined to the three big issues. In Gaslights, the "A" was very bright and active, and scored at the opening that advance which might well have been accorded the previous week. The improvement proceeded from day to day with a rise in the quotation, and culminated with a mark of 319 on Saturday, when the stock was at its most active point. The secured issues were not touched, except for a few deals in the 7 per cent. limited. South Metropolitan made no sign; business being moderate, and prices about middle figures. Nothing at all was done in Commercials. Transactions in the Suburban and Provincial division were more numerous than of late. Prices in general were good, but none of the quotations varied. Among the Continentals, Imperial naturally engrossed attention. The tendency throughout the week was more favourable; and the stock touched 220 more than once. But on Saturday the publication of the intelligence that the Vienna Municipality had resolved to have no further negotiations with the Company caused fresh uneasiness; and the price fell suddenly to 214. But no one knows what may happen yet; the ways of the Viennese are not like our own. The Company's term has yet some time to run; and the unexpected may happen after all. At present, however, all is absolute uncertainty. Union was a little dull, and the price fell a couple of points; but European was untouched. There was no incident to note in connection with any of the rest. Business in the Water Companies was very quiet and unimportant. Prices were irregular; and Lambeth tens rose, while East London and Grand Junction had a fall.

The daily operations were: The Gas Market opened firm on Monday, but did not rouse up much all day. Gaslight "A" advanced 2. Business became more active on Tuesday; and prices held their position well. Gaslight "A" gained 1 more. Continental Union fell 2. East London Water was 2 lower. Wednesday was a very busy day. Gaslight "A," South Metropolitan, and Imperial Continental were much dealt in; and again Gaslight "A" advanced 1. Lambeth Water was 1 higher. Business slackened on Thursday; but Gaslight "A" improved 1 more. Lambeth Water did the same. Friday was a very quiet day; and Gas quotations were unchanged. Grand Junction Water receded 2. On Saturday Gaslight "A" was strong and active; but Imperial Continental fell 2.

ELECTRIC LIGHTING MEMORANDA.

An Important Report on Tramway Traction—In Favour of the Trolley Wire—Overhead Wires Defended—The Case of Glasgow—Testimony of the British Electric Traction Company.

THE full text of the report of the General Manager and the Engineer of the Glasgow Corporation Tramways on their tour of investigation in the United States has been published, and will form the standing dish to which all those who seek expert assistance to the understanding of the conditions of the problem of the mechanical working of tramways will turn for refreshment until it grows too stale. The two experts—Messrs. John Young and William Clark—were sent to America by the Glasgow Corporation to find out all there was to learn about mechanical traction as applied to street tramways; and more competent inquirers could hardly, we suppose, be found. The net result of their journeyings, it may at once be stated, is a recommendation of the adoption of the overhead trolley-wire system for the Springburn route of the Glasgow Corporation tramways. Such advice is certain to have serious and widespread influence; and we therefore propose to follow the steps by which Messrs. Young and Clark were led to offer it to their employers.

The reporters commence by observing that it is about the lifetime of one generation since tramways or street railways became recognized as a necessary of city life—horse traction being almost solely employed to work them up to ten years ago. Since then (speaking always of the United States) many forms of traction have been tried; and the struggle for supremacy has been fierce and continuous. In 1890, there were in the United States 9037 miles of street railways, of which 5400

miles were worked by horses, 510 miles by cable, 604 miles by steam, and 2523 miles by electricity. The length has now been increased to 15,956 miles, of which 1351 miles are still operated by horses, 612 miles by cable, 384 miles by steam, and 13,609 miles by electricity. Such statistics are enough to show the line along which development has been most active. With regard to the different systems tried and in use, the report states that storage batteries were adopted some years ago in Washington and other places; but, after a large amount of money had been expended in experimenting, the system was definitely abandoned as a failure. Mr. Yerkes, of Chicago, tried the Connelly oil and gas motors; but they proved unsuccessful as well as unpopular, and were given up. This, the report states, is the same system that the Glasgow Sub-Committee inspected at Croydon; but there must be some mistake here—the Lührig system being the one tried. Compressed air systems are mentioned in the report with much reserve. With regard to electric open conduit and underground systems, the report is distinctly unfavourable. Such systems must be expensive in construction, and the working results are nowhere particularly good. The cable system is declared to be superseded, American street railway men, one and all, speaking of it as a "back number." The electric overhead, or trolley, system is classified as the standard system of tramway traction in America. This dates from eight or nine years ago; and "since then the mileage of the American street railways has been practically doubled. At the present time no less than 85 per cent. of the total mileage is operated by the trolley; and the percentage is daily increasing. With the exception of Washington and New York, every city in America possesses, and is well served by, the trolley system; and in no case has the overhead system, when once introduced, ever been abandoned. After seeing the best overhead construction for the electric overhead system, and considering its vast importance as a means of rapid transit for passengers on city and suburban streets and roads, we are perfectly reconciled to it, and feel that it only wants to be seen in use to be appreciated." This is very strong testimony.

The report admits that the overhead arrangements are not an advantage, and that if any system as good and as cheap were to be had without them, it would be preferred. But there is none such known at present. The reporters "feel sure that if the citizens saw this system of rapid transit in operation on the Springburn route—comfortable cars, propelled, illuminated, and heated by the same power—they would not for a moment object to the appearance of neat poles to carry the wires, especially if the old lamp-posts were done away with, and the trolley poles made use of for electrically lighting the streets. We believe the citizens would soon conclude that it was beautiful as a whole." There is nothing like pitching the key high when one has to sing a song of praise. Messrs. Young and Clark are so persuaded of the overwhelming advantages of the trolley-wire system, that they go outside their proper limits to meet the æsthetes on their own ground, and claim actual comeliness for the system, on the score that "handsome is as handsome does."

It is asserted that while the trolley-wire system reasonably fulfils all the requirements of a municipal service of rapid street transit between the central region and the outskirts, it can be made as safe in all respects as any other method of traction. The report betrays the existence in its authors of a consciousness that the main objections to the trolley-wire system of tramway traction refer to the danger which it creates above and below ground, and the unsightliness of the posts and wires. The latter question has already been discussed. Upon the same head, the reporters argue further that there is a neat as well as a slovenly way of equipping a trolley line. They claim that the cars can be made clean, comfortable, and attractive; and they assert their belief that the poles, if of neat design and judiciously placed and made use of for street lighting, need not offend the eye. With regard to the question of danger, it is alleged that there is practically none from the overhead wires, provided they are properly maintained. This statement hardly agrees with the common repute of the system. The risk of electrolysis is dismissed as non-existent, now that the Board of Trade has taken the matter in hand.

Finally, the question comes to this: Glasgow has many miles of excellent tramways which could be adapted to the trolley system (in conjunction with electric lighting for the streets) at a cost which would about double the existing capital. For this there would be gained a reduction of 15 per cent. in the ratio of operating expenses to receipts, an increase of 50 per cent. in the speed of the cars, and probably a growth of 25 per cent. in the number of passengers. A trial is recommended on a particular route 2¼ miles long, at an estimated cost of £19,575, in order to see how far these anticipations can be realized in the local circumstances. The matter is to be taken in hand by the Tramways and Electric Lighting Committees, with a view to proving the virtues of the proposed combination of electric traction and lighting for a portion of the selected route. The electric power would, of course, be supplied by the Corporation electric lighting station. The experiment cannot fail to be extremely interesting; but it may be suggested that the proposed combination of electric street lighting and tramway working would not tend to a clear demonstration of the intrinsic merits of either venture.

In connection with this proposed Glasgow experiment, it may be mentioned that, at the recent first ordinary general meeting of the British Electric Traction Company, the Chairman—Sir Charles Rivers Wilson—reported that the Company are promoting an extensive tramways amalgamation scheme in the South Staffordshire district, whereby the merits of the trolley-wire system will be put to a crucial test over a very large tract of country which has few "amenities" left to spoil.

THE CHEMISTRY OF MANUFACTURING PROCESSES.

When, in March last, we reviewed the first volume of Messrs. Blount and Bloxam's text-book of "Chemistry for Engineers and Manufacturers," we warmly welcomed the work, and confessed the keen interest with which we awaited the appearance of the second volume. This has now been published;* and it is possible to state at once that it amply bears out the promise of the first instalments. The authors have apparently found it necessary to explain once more that their object is limited to the presentment of the principles which underlie the several manufactures they describe. But this is precisely what the ordinary handbook of a manufacture usually fails to do; and the measure in which the present work supplies the why and the wherefore of technical processes is the gauge of the authors' success. There are plenty of books to tell the technical student how things are done in the particular industry to which the author's attention is devoted—or rather, in the majority of cases, how they *were* done at some time or other. But the dominant principles of industrial practice are too often overlaid by the mass of detail with which technical manuals are crammed. In other words, the learning and industry of authors of text-books and treatises on manufactures is usually more conspicuous than the intelligent and helpful critical faculty which interprets the lessons of history and discloses the lines of improvement. Technical writers are not solely to blame for this tendency to forget the key that would admit their readers into the arcana of matters industrial; for as Messrs. Blount and Bloxam remark, working specialists themselves do not always distinguish properly the principles by which their operations should be guided, with the result that they are unable to criticize their methods in the light of knowledge which is common enough outside their sphere. So it has happened over and over again in the arts that while men have "builded better than they knew," they might have done much more if they had known more completely what they ought to do.

The volume under notice runs to 437 pages of closely-printed matter, with illustrations; and it has been divided into eighteen chapters, appropriated to as many different industries, or groups of industries. With most of these we have here no concern. We must, however, introduce readers of the "Journal" to the authors' method of treating the vast subject of "Destructive Distillation," and glance at their disquisitions upon certain other matters of more or less subsidiary interest to gas manufacturers. The chapter devoted to the above subject describes and discusses the application of this process to coal, wood, shale, and bones, and criticizes the results of the operation. When the class of substances so treated is composed of such carbon compounds as are split up at a high temperature, with the evolution of gaseous and liquid products—a residue relatively richer in carbon being left in the retort—the process becomes "carbonization." Such bodies are coal, shale, and wood—to which some would add mineral oils.

The nature of the products of destructive distillation is stated to be dependent on temperature, and, in a minor degree, on pressure. To Mr. E. J. Mills is ascribed the statement of the fact that, at high temperatures, aromatic hydrocarbons—such as those of the benzene and homologous series—predominate in the liquid products; while at low temperatures hydrocarbons of the fatty or paraffin series are present in greater amount. From this it follows that coal carbonized in iron retorts must yield different results, not merely in quantity but also in kind, from those produced by its carbonization at a high heat in clay retorts. So that it is not safe to compare the indications of different carbonizing tests with one another, unless the conditions are known to be similar.

In describing the carbonization of coal in retorts for gas production, the authors take a good modern example of a regenerative setting, and explain its working and results; referring to their first volume for the description of the gas producer. Their special care as chemists begins when they come to the results of the distillation process. With regard to this they say: "The influence of temperature upon the quantities of gas and tar produced is generally seen in the large volume of gas evolved at high temperatures, and the smaller amount of tar." They also admit that, at a high temperature, the tar is less valuable and more viscid. As to the deposit of carbon inside the retorts, it is observed that this is the product of the decomposition, or "cracking," of the illuminating hydrocarbons, which is a disadvantage, slightly set off by the consideration that heavy hydrocarbons that would otherwise condense in the tar are cracked, with the formation of less condensable gaseous illuminants. Mention is made of the liming of coal before carbonization, with the principal object of increasing the proportion of nitrogen recovered as ammonia. But though it is shown that

* "Chemistry for Engineers and Manufacturers. A Practical Text-Book." By Bertram Blount and A. G. Bloxam. Vol. II.—Chemistry of Manufacturing Processes. London: Charles Griffin and Co., Limited; 1896.

there is plenty of room for improvement in this regard, the prospect of realizing it is not criticized. Different gas managers have tried steaming the charge in the retort the last thing before drawing it; but the authors do not mention this method.

The authors illustrate and describe a typical gas manufacturing plant, with the exhauster placed after the condenser. The principles of the successive processes through which the gas passes are lucidly expounded. The use of air and oxygen in purification, and the recent adoption of Weldon Mud for catch purifiers, are noticed. We have not detected any error in the pages devoted to this part of the subject, with the exception of the spelling of "metre" in the description of the station meter, which is doubtless a slip. Mills, Butterfield, and Lewis T. Wright are quoted for the average results of carbonization in large works, the average constituents of Durham coal gas carbonized at moderately high temperature, and the influence of the temperature of the retorts on the composition and quality of the gas. The methods of testing gas for illuminating power and purity are next described. This leads up to the discussion of the question upon what the light-giving property of gas mainly depends. The authors are very cautious in dealing with this problem, which they acknowledge to be not quite so easy of solution as was formerly supposed. It is a significant piece of modesty, that they should say on this head: "The illuminating power of coal gas doubtless depends on the nature and quantities of its constituents; but the relation between the two is not yet thoroughly ascertained." The old criterion of "carbon density" is declared to be of doubtful value; and the authors are evidently attracted by the acetylene theory of Professor Lewes, without accepting it as proved.

A departure is quickly made from the discussion of intrinsic illuminating power to the lighting value of burners. The information concerning burner performance is not quite up to date; while the comparative duty of the different kinds of burners, quoted from A. Wilson, is far below the mark of modern realization. It is the same with regard to the subject of gas enrichment. We are told correctly what happens to the gas and the tar when cannel is carbonized with coal; but the authors apparently do not know that Glasgow is no longer supplied with 27-candle gas. They might have referred to condensation in the street mains when mentioning Scotch gas.

The "increasing dearness and badness of cannel" are posed as the reasons which have led to the employment of other methods of enriching coal gas; carburetted water gas being named as that at present most in use. The information respecting the manufacture of this mixture is decidedly "skimpy;" nothing being said as to the proportions of the raw materials used to produce a certain result. The authors state that "the cost of carburetted water gas is not very different from that of coal gas; its advantages lying less in cheapness than in ease of control and adaptation to the maintaining of the illuminating value of the coal gas with which it is mixed." But a show of the data upon which this sweeping, yet withal quite reliable, generalization is based would not have been superfluous. Very strangely, the authors state that oil gas is not used for enriching coal gas. Where were they when the Peebles process and its analogues were brought out? This portion of the book requires revision.

The nature of gas liquor and its industrial treatment are briefly described; coal tar being treated at much greater length, as its complex character and multitudinous derivatives deserve. The subject of gas coke is dismissed in five lines. Considerable space is given to the subject of oven coke manufacture, the successive stages of which, from the crudity of the "Meiler" to the refinement of the Simon-Carvès retort-oven, are traced; stress being laid upon the practical difficulty of reconciling the production of the best coke with the recovery of the residual products. The possibility of carbonizing peat is mentioned, only to introduce the remark that, at the present price of other carbonaceous materials, the prospect of the remunerative distillation of peat is remote. Charcoal burning is described at some length; and so is the destructive distillation of shale for the production of paraffin oil. The authors remark that the main difference between shale and cannel coal consists in the percentage of ash, rich shales approximating to cannel in their composition. It is stated that the ammoniacal liquor resulting from the distillation of shale mainly differs from gas liquor in containing a smaller quantity of sulphur compounds. At one time, say the authors, the distillation of bones was the chief source of ammonia; but the importance of this source has declined since the birth of coal-gas manufacture. Sulphate of ammonia made from bones is usually high coloured, from the presence of pyrrol red.

There is a chapter on petroleum, which contains in concentrated form a good deal of information, not, of course, pretending to be novel. Lime-burning, the preparation of artificial manures, cement-making, and the manufacture of paints, are treated by the authors in a manner worthy the attention of students of gas engineering, who ought to know at least where to lay hands upon information concerning such matters. There is included with other minor chemical manufactures an account of the preparation of cyanides; but the authors do not describe any direct cyanide process in connection with gas manufacture. The book concludes with a useful bibliography of technical works of reference, and is provided with a very full index. Altogether, these volumes will be found most valuable by those for whose use they have been so ably written.

OBITUARY.

The death took place on Tuesday last, in his 60th year, of Mr. Alderman JOHN FOLLETT, of Basingstoke. Deceased was Vice-Chairman of the Basingstoke Gas Company.

A vacancy has occurred on the Board of the Wilmslow Gas Company by the death of Mr. W. SHARP, the Chairman of the Company. Deceased was a few years ago an Alderman of Salford, and occupied the position of Chairman of the Gas Committee at the time of the notorious "scandal." He was also a Director of the North Cheshire Water Company at the time of his death.

Telegraphing yesterday afternoon, our Edinburgh Correspondent said: "Mr. F. T. C. LINTON, the Manager of the Leith Gas-Works for twenty-seven years, died at his residence, Blacket Place, Edinburgh, on Sunday morning, after having suffered for several years from catarrh of the stomach. This afternoon, the Gas Commissioners, at their monthly meeting, had before them a recommendation by the Special Committee they had previously appointed for the purpose, that Mr. Robert Mitchell, the Manager of the Edinburgh Gas-Works, should be allowed to retire upon a pension of £250 during pleasure, and Mr. Linton on his statutory pension of £450. Under the circumstances, Lord Provost M'Donald proposed that a letter of condolence should be sent to the family of Mr. Linton, and that the recommendation regarding Mr. Mitchell should be adopted. This was agreed to. It was also resolved to advertise for an Engineer and Manager over the whole works of the Commission. Mr. Linton was 56 years of age. He learned the business of engineer with Bertram's, of Edinburgh. He leaves a widow, but no family."

PERSONAL.

We learn that Mr. FLETCHER W. STEVENSON, the Engineer of the Sheffield United Gaslight Company, has declined to act as Arbitrator in the dispute between the Rotherham Corporation Gas Committee and their stokers.

Mr. J. O. Phillips having resigned his seat on the Board of the Danish Gas Company, the vacancy has been filled by the appointment of Mr. R. S. GARDINER, who was for some time Secretary of the Imperial Continental Gas Association.

Mr. SAMUEL BENNETT LANGLANDS, assistant to Mr. James M'Gilchrist, of Dumbarton, has been appointed Gas Manager and Water-Works Inspector to the Coleraine Town Commissioners—a position formerly held by Mr. W. S. Stormonth.

The Bradford Corporation Water Committee last Thursday made a happy recognition of the willing manner in which Mr. GEORGE METCALFE, a landowner at Pateley Bridge, had met the Corporation in their negotiations for the acquisition of property required for the new water-works, by presenting him with a silver bowl and a pair of candlesticks. The agreeable duty of handing the gift to Mr. Metcalfe was performed by Alderman Holdsworth, the Chairman of the Committee.

The question of the acceptance of outside work by Mr. J. TIMMINS, Assoc.M.Inst.C.E., the Gas Engineer of the Wigan Corporation, has lately been under the consideration of the Gas and Electric Lighting Committee; and they have decided to grant him from time to time permission to advise any authority or company within a radius of fifteen miles from Wigan who may desire his assistance. All work thus undertaken is to be performed out of official hours, and to be subject to the approval of the Committee.

With the growth of the City of Coventry, the work connected with the office of Borough Surveyor has been increasing to a considerable extent, and has at length necessitated the reorganization of the department. The present occupant of the position is Mr. E. J. PURNELL, whose duties have embraced the management of the water-works. The first step in the changes has been the appointment of Mr. Purnell as Water Engineer; and this is to be followed by the engagement of a Borough Engineer, after which the completion of the scheme of reorganization will be taken in hand.

The exceptionally long and faithful service rendered to the town of Nottingham by Mr. Alderman BARBER, J.P., who has been a member of the Corporation for fifty years, was fittingly recognized on Monday last week, by the presentation to him of a testimonial consisting of a large bowl, a pair of candelabra, and a salver, all of solid silver; the last-named article bearing an appropriate inscription. The presentation, which was subscribed to by the Magistrates, past and present members of the Corporation, and officers, was made by the Mayor (Alderman E. H. Fraser), who referred to the difficulty of realizing what fifty years' service for the benefit of the town really meant. During his long connection with the Corporation, Alderman Barber had, he said, been Chairman of nearly all the principal Committees; and throughout he devoted himself to his duties with an absolute singleness of intention. He concluded by offering the gifts, accompanied by the expression of the donors' affectionate sympathy and personal regard, which, he was sure would be equally valued by the recipient. Alderman Barber having briefly responded, the pleasant function was brought to a close. It may be added that Alderman Barber has been the Chairman of the Gas Committee since 1883.

NOTES.

A Practical Road Motor Car.

The prevalent impression that a very ordinary adaptation of steam locomotive practice to the conditions of common road traffic is competent to solve the motor car problem in certain circumstances, receives confirmation from the reported success of the Scotte road trains in France. The so-called "Train Scotte" consists of a motor car with a trailer adapted to the conveyance of either passengers or goods. This, it may be observed, is quite in accordance with the new English law on the subject, which contemplates the use of motor cars drawing not more than one carriage or truck. A feature of the Scotte system consists in the use of coke for fuel, as being cleaner and more convenient than any other form of combustible, as well as being easily procurable everywhere. The average coke consumption of the Scotte locomotive is 1 cwt. per hour; and a box is carried in front of the motor car which holds sufficient fuel for a fourteen hours' run at a speed of from 7½ to 9½ miles an hour. As a passenger train, 40 persons can be carried at this rate of speed in the motor and trailer; while when used for goods traffic, the train will have a load of 5 or 6 tons at a speed of from 4 to 4½ miles an hour. There is nothing special about the boiler employed, which is of the Field vertical type; and the driving is effected by means of chain and wheel gearing, as in bicycles. The Scotte train is not a beautiful or pleasure-giving mode of travel. But, under certain conditions and in many localities, it is calculated to be useful; and it has the advantage of being actually available.

Observations on Carbon Monoxide Poisoning.

It has already been briefly noticed in the "JOURNAL" that Dr. Haldane gave a demonstration at the British Association meeting of his method of detecting the presence of carbon monoxide in air, which depends upon the fact that mammalian blood which has been exposed, by the act of breathing, to carbon monoxide, is rendered pink in a dilute solution, while oxygenated blood is yellow. Dr. Ludwig Mond discussed this method; agreeing with the author that the prolonged inhalation of air containing a small proportion of carbon monoxide is extremely dangerous, while a puff of the fairly concentrated gas could be borne if access could be had immediately afterwards to fresh air. This has been his own experience and that of others who have worked with him. Professor Harold B. Dixon referred on the same occasion to a case in which he had been asked to act as umpire, when a strike was threatened against the employment of certain blasting agents alleged to give off gases containing carbon monoxide. He found the determination exceedingly difficult to made, and had always taken a run after breathing too much of the spent gases. Dr. Haldane thought this story sufficiently disproved the notion that the gases in question contained carbonic oxide; because it is impossible for anybody to run after having breathed it. Cold air seems to deprive sufferers from this gas poisoning of the use of their limbs. In explosions in mines, the men fall over from want of oxygen; but they would recover, and not be killed, if it were not for the carbon monoxide. Oxygen cylinders are a remedy; but a respirator capable of absorbing carbon monoxide would be a great boon.

A Gas-Power Electric Lighting Station.

The "Engineer" of the 13th ult. contained an illustrated account of the gas-power electric lighting station at Leyton, constructed for the District Council under the advice of Professor Henry Robinson. The station is worked by gas-engines supplied with semi-water gas made from anthracite in Dowson producers. The producer-house contains two producers, each capable of supplying all the gas expected to be required at the outset; and there is room for a third. Two small vertical boilers are provided to generate steam for the forced draught jets of the producers; each boiler being capable of serving the two producers. The gas is washed and scrubbed with coke and sawdust; and there is a holder 20 feet by 10 feet, to equalize the gas production as well as to provide storage for running the engine for a short period. The town's gas is laid on to the engines, in case the Dowson gas should fall off in quality with a light load. The engines (two in number, to start with) are of 55-horse power nominal, made by Messrs. Wells Bros., of Nottingham. The gas passes from the holder in 9-inch cast-iron mains, with 5-inch branches to the engines. The air supply to each engine is drawn through a 5-inch pipe, through a silencing box outside the engine-house. The exhaust passes through a 6-inch pipe into a 12-inch main, which discharges into an underground silencing-box filled with stones, and having a vertical outlet-pipe 12 inches in diameter extending above the engine-house roof, with an arrangement of baffle-plates at the top. The gas-producer house is 46 feet long and 18 feet wide; and the engine-house is 60 feet long and 37 ft. 6 in. wide. A test of the gas-producing and power plant was made on Oct. 6; and though full load was not put on, the consumption of fuel compared favourably with the performances of steam plant using the most efficient boilers and high-pressure compound condensing engines of large power. The trial run lasted 5 h. 35 min.; the level of fuel in the producer and the level of the holder being the same at the start and finish. The total number of Board of Trade units generated was 280; and the fuel consumption was as follows: Anthracite, 448 lbs., equal to 1·597 lbs. per unit; [coke, 52 lbs., equal to 0·186 lb. per unit—total, 1·783 lbs. of fuel per unit. This represents a cost of less than 0·22d. per unit for fuel.

The Economy of the Steam-Turbine.

Some remarkable results are recorded of the working at the central station of the Newcastle and District Electric Lighting Company of a Parson's steam-turbine, coupled direct to an alternator. The interest of these tests, which were made by Mr. William D. Hunter, is considerable, in view of the generally entertained belief that for a wide range of work, including the driving of road carriages, a rotary motor of even moderate economy would be preferable to a reciprocating engine. The plant at Newcastle consists of a compound steam-turbine of Messrs. C. A. Parsons and Co.'s latest type, geared in the ratio of two to one, by helical spur gearing, to one of their standard type 150-kilowatt alternators. The speed of the turbine is 9400 revolutions per minute; that of the alternator and exciter being one-half this rate, or 4700 revolutions per minute. The pressure of steam in the steam-chest of the motor was 70 lbs. per square inch; and the vacuum was from 26⅛ to 26¾ inches. The consumption of steam was measured by carefully calibrated tanks from which the feed was drawn; and it was not superheated. The steam used worked out to 17·28 lbs., 20 lbs., and 21 lbs. per electrical horse power per hour, for full, half, and quarter loads respectively. The generator worked throughout the trials most satisfactorily; and the governing was excellent. Notwithstanding the high rate of speed, the machinery is reported to have run very smoothly.

Nitrate of Soda not a Perfect Fertilizer.

Some attention having been aroused by certain statements emanating from gas engineering sources, to the effect that sulphate of ammonia used alone is not a perfect plant-food, it may be as well to record here that the writer of an exhaustive notice of the Chilian nitrate of soda industry in "Engineering" has stated precisely the same thing in regard to this source of nitrogen. It is observed that the use of nitrate of soda as a fertilizing agent is of comparatively recent date; being due to a suggestion of the French chemist Boussingault. Nitrate of potash was, however, used centuries earlier. The soda in the Chilian product cannot be said to have much effect on vegetation, though some plants, such as the sugar cane, are found on analysis to contain considerable proportions of the salt. Nitrate of soda is a good medium through which the nitrogen in it can be applied to the soil, and, being easily soluble, it requires much less manipulation than other fertilizers. "Applied alone to land that is poor, it has little or no effect; so that it cannot be considered a complete fertilizer." It requires to be mixed with substances containing the phosphates, lime or potash, and is then a good artificial manure, though not endued with good keeping qualities, owing to its deliquescent nature.

TECHNICAL RECORD.

AMERICAN GASLIGHT ASSOCIATION.

The Annual Meeting at St. Louis.

(*Concluded from p.* 1183.)

Mr. T. Littlehales, of Syracuse (N.Y.), read a paper on "Service-Pipes," in which he insisted on the importance of testing every pipe for soundness before it was laid. Some years ago, he submitted every length out of a consignment of about 12,000 feet of ¾-inch and 1-inch pipe to a steam pressure of 40 lbs. per square inch. Every defective piece was cut out; and the whole of the pieces thus rejected were joined up, and tested with gas at 2 inches pressure. The leakage was 40 cubic feet per hour, equal to 350,000 feet per annum. As the cost of the testing was only about £2 10s., this showed that the money was well spent. As the result of following up this plan, the author's unaccounted-for gas was under 5 per cent. Another consignment of pipe, representing 26,000 feet, was also tested by steam pressure. Ten defective places were found, which were joined up as before. The leakage, at 15-10ths pressure, was equivalent to 300,000 cubic feet a year; and at 20-10ths, to 400,000 cubic feet. The consignment was of excellent quality; and the defects were either scale holes or defective weldings, that would not be likely to attract the fitter's attention. After testing the pipes, they were coated with a thick paste of tar and rubber; and a second coat was laid on as thick as possible after they were placed in position in the trench. Many leakages took place at the junction of the main and service; and he never connected a service to a 3-inch or 4-inch main without using a clip. Service-pipes might with advantage be laid larger than usual. A friend of his put down nothing less than 1¼-inch pipe; and though at first sight this appeared extravagant, on reflection it would be seen that the cost was very little more. For ordinary purposes, cocks on the service were unnecessary. From some inquiries he had made, he had reason to believe that steel pipes were rather more durable than wrought-iron ones.

Mr. A. C. Humphreys, of New York, followed with a paper on "Coating Service-Pipes," describing the method which had

been adopted as the result of many experiments by General Hickenlooper, of Cincinnati. Twenty gallons of tar were raised to gentle boiling; 20 lbs. of fresh slaked lime were then sifted on to the surface, and well stirred in; and the whole was boiled down to a consistency half way between tar and pitch. After settling for a few minutes, 4 lbs. of tallow and 1 lb. of powdered rosin were thoroughly incorporated with the mixture, and the whole ladled into barrels. When required for use, the mixture was heated to about 100° Fahr.; and to each barrel of 45 gallons, was added 4 lbs. of crude rubber previously dissolved in turpentine. This process was now adopted at all the stations of the United Gas Improvement Company; and if carefully carried out, it was thoroughly successful. The pipes were first warmed in a box heated by steam; then dipped one by one in the mixture; and finally dried on racks arranged to keep one from touching another. The pipes were plugged at each end, to keep the coating from getting inside; and they were first carefully cleaned with steel brushes.

Mr. A. B. Slater, of Providence, submitted a paper on "The Use of the Jet Photometer." In describing the various forms of this apparatus, he divided them into three classes—constant pressure, reading by height of flame, constant height of flame, reading by pressure, and constant height of flame, reading by volume. Most of these were intended to be applied to ordinary coal gas of from 14 to 19 candle power; and when used with cannel or oil gas, the specific gravity had to be considered. Friedleben had observed that, if the flame was lower with an equal or slower flow, carbonic acid or other heavy gas was present; if lower with a quicker flow, marsh gas or ammonia was present; but if higher with a slower flow, the presence of olefiant gas was indicated. In the first two cases, the quality would be low; and in the third, high. This showed that the jet must be specially adapted to a certain quality and composition of gas; and if used for another kind, it would not be accurate. A Lowe jet designed for coal gas, would not give accurate indications with water gas; and if for coal gas with cannel as enricher, a change to oil as the enriching material would affect the results.

In the discussion on the paper, Mr. A. S. Miller remarked that the indications of the jet varied not only with the quality of the gas, but with the state of the barometer and thermometer. Used with intelligence and care, however, it was a valuable instrument on the gas-works. Mr. Somerville said that when used with reason, the jet photometer was a good approximate indicator of illuminating power. Mr. A. C. Humphreys agreed that the value of the jet turned upon the way in which it was used. Mr. Slater, in the course of his reply, said his principal object in reading the paper was to show that the jet photometer could not be used for different kinds of gas. He had known many cases of coal gas being replaced by water gas, and the same jet being retained in use.

Mr. A. E. Forstall, of Newark (N.J.), forwarded a paper on "Wet Heat or Dry Heat—which Gives the Best Results in Purification," in which he contended that the advantage gained by adopting Dexter's system of admitting steam at the inlet of the purifiers, was due to the heat thus introduced, and not to the moisture. The latter he regarded as a drawback; and he had introduced a system of dry heating, consisting of coils of steam-pipe laid in the bottom of the purifier. A little moisture was necessary for the proper chemical action to obtain; but he submitted that the gas as it came from the scrubbers was saturated with water vapour, and that further moisture was a detriment, and not a benefit. After some experience, his verdict was decidedly in favour of dry heat for purification.

The concluding item on the *agenda* was a discussion of the contents of the Question Box.

THE EXPLOSIVE PROPERTIES OF ACETYLENE.

In view of the interest now being taken in the above subject, in consequence of the projects which have been started for facilitating the use of acetylene as an illuminating agent, and more especially of the dangers which attend its manufacture and transport, it may not be out of place to reproduce, by way of supplementing the remarks of Professor Lewes in his concluding Cantor Lecture at the Society of Arts, given in the "JOURNAL" last week, the following comments on the memoir lately presented to the Academy of Sciences by MM. Berthelot and Vieille, contributed to a recent number of "Nature," by Professor Smithells, of the Yorkshire College, Leeds.

The authors state that, in acetylene at ordinary pressures, neither an electric spark nor a flame, nor an explosion of fulminate, will cause more than a local dissociation of the gas (a fact already established by Professor Harold B. Dixon); but that if the gas be compressed beyond two atmospheres, the dissociation, once started, is propagated without sensible diminution throughout the whole mass of gas. In this way, dissociation of the gas was effected in a tube 20 millimetres in diameter and 4 metres long. The acetylene splits up into pure hydrogen and a friable mass of carbon, which forms a cast of the containing vessel, and can be withdrawn intact. At a pressure of 20 atmospheres, which is about half the tension of the saturated vapour of liquid acetylene at 20° C., the explosion develops a tenfold pressure; but the rate of propagation is much below that of the true explosive wave of such a mixture as electrolytic gas. The temperature due to the explosion at this pressure is calculated to be 2750° C. As the violence of the explosion becomes greater with increasing initial compression, it was to be expected that liquid acetylene would exhibit the character of a "high" explosive. This MM. Berthelot and Vieille have shown to be the case. They exploded 18 grammes of liquid acetylene in a steel bomb of 49 c.c. capacity by a hot wire, and developed a pressure of 5564 kilogrammes per square centimetre. This corresponds to an explosion pressure for the liquid alone of about 9500 atmospheres—a value approaching that of gun-cotton. The decomposition of liquid acetylene by simple ignition is relatively slow, and appears to take place in two stages—one corresponding to the decomposition of the gas, the other to that of the liquid. In an experiment where the liquid occupied 0·15 of the containing vessel, a maximum pressure of 1500 kilogrammes per square centimetre was recorded.

Experiments were made to determine whether the compressed gas or liquid could be exploded by mechanical shock. The results were, strictly speaking, negative. Neither by fall nor crushing with a ram, nor by the impact of a bullet which pierced the containing cylinder, was the acetylene exploded. In the case of liquid acetylene, an explosion followed the shock after a short interval; but this was shown to be due to the ignition of the escaping gas, after admixture with air, by a spark from the breaking metal. A small charge of fulminate of mercury fired in the middle of a cylinder of liquid acetylene detonated the liquid, and shattered the cylinder in the manner of a true explosive.

The authors describe the conditions under which danger may arise by casual elevation of temperature during the manipulation of acetylene. In the first place, they note that, in generating acetylene by the action of a small quantity of water or excess of calcium carbide in a closed vessel, the carbide may become incandescent, and lead to the detonation of the gas. At least one accident due to this cause has already been recorded. Sudden compression of the gas in filling cylinders, or in admitting it into a reducing-valve, may likewise raise the temperature to the point of danger. A sharp mechanical shock breaking the containing vessel may cause sparks capable of firing the explosive mixture formed by the escaping gas and external air.

In conclusion, MM. Berthelot and Vieille express the opinion that the dangers of acetylene are not such as to outweigh its advantages as an illuminant. They add that, by simple precautions—such as the slow transference of the compressed gas from vessel to vessel, and the careful cooling of the vessels in which the gas is being compressed—the dangers which they have explained may be easily avoided.

Professor Smithells remarks, in conclusion, that the comfort afforded by these concluding observations is somewhat abated by the fact that the explosion at M. Pictet's factory on the 17th of October (see *ante*, p. 754) was subsequent to the publication of MM. Berthelot and Vieille's memoir. He says there is no occasion for panic; but the matter evidently demands the most careful attention from the authorities in this as well as in other countries.

NEW GAS AND COKE MAKING PLANT AT HALIFAX, NOVA SCOTIA.

In the last volume of the "JOURNAL" (pp. 817, 990), we gave some particulars of the scheme devised by Mr. Henry M. Whitney, the Chairman of the Dominion Coal Company of Nova Scotia, for the erection of coke-ovens for the manufacture and supply of gas and residual products from Cape Breton coal. In furtherance of his enterprise, which he had for some time had under consideration, he obtained the co-operation of Mr. F. S. Pearson, of New York, and Mr. B. F. Pearson, of Halifax, Nova Scotia, and secured control of the patents for Eastern Canada and the New England States of nearly all the inventions pertaining to new and useful improvements in the manufacture of coke and the saving of the bye-products of coal carbonization. It was then determined that experimental plant should be put up and operated at Halifax, which is contiguous to the Cape Breton coal-fields, where it was believed a market would be at once found for the gas. Accordingly, in November last year, a Company was formed, under the title of the People's Heat and Light Company, Limited, to carry out the project; and we learn, from particulars supplied by a correspondent, that they are now in a position to supply gas and coke from what is really the pioneer plant of the kind in North America.

In choosing a site for the location of their works, the Directors of the new Company were fortunate enough at the outset to find a place which was well adapted in every particular to the requirements of the plant they had in view. The site selected consists of 28 acres, and is situated in the south-western portion of the city, on the banks of the North-West Arm. The main buildings are substantially built of granite and brick; and the situation affords the additional advantage of having most excellent shipping facilities. About 20,000 tons of Cape Breton coal will be coked in Mond producers, in 24-ton charges, per annum; producing 200 million cubic feet of gas, part of which it is proposed to sell, after being enriched, as illuminating gas, for $1·50

per 1000 cubic feet. There will remain about 160 million cubic feet of heating gas, for which it is thought the Company will find a ready sale at 40c. per 1000 cubic feet. In addition, the Company expect to save in the process of manufacture some 4000 barrels of tar, 200 tons of sulphate of ammonia, 30,000 lbs. of ferro-cyanide of potash, 20,000 gallons of benzol, and 14,000 tons of metallurgical coke. These figures are arrived at on the basis of ascertained results, which have been found to be 1 gallon of benzol, 5 lbs. of pure or concentrated ammonia, and about 1½ lbs. of ferro-cyanide of potash per ton of coal. The purified gas will be stored in two holders of the Gadd and Mason type—the first of the kind, we believe, constructed in America.

The coke-ovens are ten in number, built on the plans of Dr. F. L. Slocum. The retort or chamber in which the coal is coked is 31 ft. 6 in. long, 18 inches wide, and 6 feet high, and holds, when charged, 6½ tons of slack coal, which, by a washing process at the mines, has been freed of all its rock, soil, and other foreign substances. Surrounding the retort in which the coal is placed are a number of lateral flues in which the producer gas and hot air meet at the bottom and are ignited. The flame passes backwards and forwards along the flues; thus carbonizing the coal in the retort. The coal is coked for 24 hours, in which time all the volatile matter is liberated; leaving the clean pure carbon. After the coal has been coked, and all the volatile and tarry constituents have been driven off, a huge ram, having a shield or head of a size and shape slightly smaller than the opening of the retort worked by steam, pushes the entire contents out on to a concrete floor, where it is first cooled, and then conveyed to the crusher and screens. Here it is automatically crushed, screened, and assorted into three sizes—viz., nut, stove, and egg—for domestic and manufacturing purposes. It is claimed for this coke that it is a superior fuel to hard or anthracite coal, being almost 40 per cent. cheaper; and, on account of its greater bulk, the wasteful overfilling of stoves, grates, &c., is more difficult to accomplish. The Company have an assured market in the New England States for all the coke they can make—in fact, they are about to enter into a contract to deliver 15,000 tons within the coming year. They are desirous, however, of securing a market nearer home. This, it is thought, can be found within the province, where large quantities of anthracite coal are sold annually. The Company have also set apart a number of ovens for the manufacture of foundry coke.

The scheme of the People's Company would necessarily have come into competition with the business of the original gas undertaking—that of the Halifax Gaslight Company, Limited—which has been in existence rather more than half a century. But we learn that it is now passing over to the new concern. For some years the shares of the Company were regarded as "gilt-edged" investments, as they carried a regular 10 per cent. dividend. Unfortunately, however, the Directors undertook an electric lighting scheme, which brought down the dividends 50 per cent.; and the value of the stock fell below par. In this condition of affairs, the new Company came forward with an offer to buy up the stock at the rate of 75 c. per dollar; and this the proprietors were advised to accept.

SOCIETY OF ENGINEERS.

The Forty-third Annual General Meeting of this Society was held on Monday last week, at the rooms of the Society, 17, Victoria Street, S.W.—the chair being occupied by Mr. S. H. Cox, the President. The following gentlemen were duly elected by ballot as the Council and Officers for 1897: President, Mr. G. Maxwell Lawford; Vice-Presidents, Messrs. W. Worby Beaumont, J. Corry Fell, and H. O'Connor; Ordinary Members of Council, Messrs. J. Patten Barber, J. Bernays, G. Burt, D. B. Butler, H. S. H. Farrar, P. Griffith, C. Mason, and S. Sellon; as Honorary Secretary and Treasurer, Mr. Perry Fairfax Nursey; as Honorary Auditors, Messrs. Alfred Lass, F.C.A., and Samuel Wood, F.C.A. The proceedings closed with a vote of thanks to the President, Council, and Officers for 1896, which was duly acknowledged by the President.

The Annual Dinner of the Society took place at the Holborn Restaurant last Wednesday—the chair being occupied by the President. In responding to the toast of the evening, he alluded to the antiquity of the Society, which was founded in 1854, and said that, though old age did not invariably carry honours with it, he thought the Society was as well preserved and as capable of doing as good work now as in the heyday of its youth. A study of the Transactions showed that there was no falling off in the quality of the papers; and all would agree that, so far as the discussions were concerned, the difficulty was not to find those who were ready to express their opinions, but to afford every one who wanted to speak the opportunity of doing so in the limited time at disposal. During the past year, the usual vacation visits had been paid; and the members of the Society had to express their thanks to those who had so kindly received them. In conclusion, he thanked the President-Elect (Mr. Maxwell Lawford) for having attended to the presidential duties during his own enforced absence from England, and paid a high compliment to the Secretary (Mr. Pryce Cuxson), in whom, he said, the Society possessed a "tower of strength." The proceedings were, as usual, of a most harmonious character.

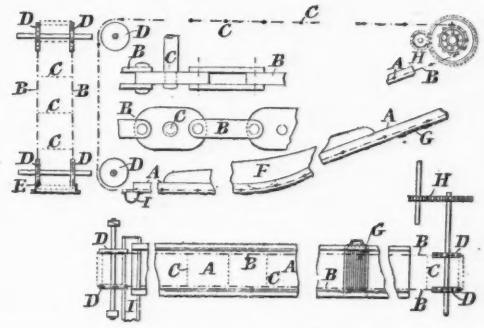
REGISTER OF PATENTS.

Production of Gas from Hydrocarbon Oils.—Middleton, R. E., of Victoria Street, S.W. No. 15,254; Aug. 14, 1895.

This invention relates to the use of an electrical arc introduced into hydrocarbon oil contained in a closed chamber; the current heating the arc, and causing the particles of oil to be vaporized in the form of gases, which may be used in conjunction with coal gas for lighting or heating purposes. In some cases glycerine may be acted upon in similar manner; thus creating a high state of incandescence, so as to vaporize it and create a gaseous vapour as an illuminant for either ordinary, medical, or other purposes.

Conveying Incandescent Coke from Retorts in Gas-Works, Extinguishing same during its Passage along the Apparatus, and Screening the Coke, and Piling up, Storing, or Discharging It into Waggons or other Receptacles.—Brouwer, J. de, of Bruges, Belgium. No. 23,770; Dec. 11, 1895.

This invention consists of a gutter-shaped track, arranged in proximity to the mouth of a retort, into which the coke can fall when drawn, and then be slid along and up the track, be cooled during its travel, and screened—the screen or grid being removable, "for the separation of the inferior body which usually forms at the mouth, and is first discharged."



A photographic view of the arrangement appeared in the "JOURNAL" for Jan. 7 last (p. 23); and the accompanying diagrams show side and end elevations of the plant itself, and of the chain links and cross-bars employed in its working.

A is a gutter or track of metal or masonry, laid on the ground or under ground, into which the coke falls after its discharge from the retorts. In this track travel two endless chains B (connected to each other by iron bars C at intervals), drawn or carried along by toothed wheels or rollers D. A water-spray pipe E is arranged at the side of the gutter. At a certain point (say, at F) of the apparatus situated outside the space necessary for working the furnaces, the track rises at an incline, varied according to local requirements; and at a certain height, the track has a sliding grid or grating G.

The working of the apparatus is as follows: The toothed driving-wheels H gear with the chains B, and cause them to travel round, drawing the coke with them by means of the transverse connecting-bars C. The coke is drawn along, and falls out at the end of the gutter-track, except the portion which is screened through the grid, as afterwards explained. At the same time, a supply of water from the pipe fitted at the side of the track partly cools the hot coke; and, in addition, the water which is swept onwards by the coke drawn by the chain up to the point where the track begins to rise, forms an eddy, and as it cannot rise up the incline with the coke, it pours back over the coke, "entirely suppressing the remaining heat." The water left after this may remain in the gutter for the next operation, or be run into a drain I.

The workman in charge has under his control a sliding grid working in the bottom of the gutter-track at a suitable spot, and which "allows the cinders and coke *débris* to fall through at the spot chosen for the purpose; and by drawing out the slide, the bad quality coke which usually forms at the mouths of the retorts and comes first, can be separated from the rest of the coke behind it as it travels along."

Coin-Freed Gas-Meters.—Beechey, C. G., of Liverpool. No. 24,133; Dec. 17, 1895.

This invention has reference to gas-meters (or analogous apparatus) in which the placing of a coin causes a given quantity of gas to pass, and after such quantity of gas has been passed, the apparatus will automatically become stopped or locked, and no more gas can pass through until another coin is placed therein.

Fig. 1 [p. 1236] is a plan of a dry gas-meter, according to this invention, with the covers enclosing the automatic mechanism removed. Fig. 2 is another outside plan, with the covers on. Fig. 3 is a side sectional elevation. Fig. 4 is a front elevation. Fig. 5 is a sectional elevation of the automatic indicator, showing the value of the gas delivered.

A is the body of the meter, and B is the cover, beneath which, in a chamber in the upper part of the meter body, the price-changing means, and the parts by which the movement of the gas-measuring parts of the meter is transmitted to the coin actuated or automatic portions of the apparatus, and the counting mechanism are disposed. Of these a shaft C (as usual) is the means of transmitting movement from the gas-measuring parts to the counter wheels; and from this shaft (through a worm D thereon), together with the action of the coins introduced, the actuating of the automatic mechanism is effected. The means of conveying this motion consists of a train of wheels, comprising: A worm-wheel 1, driven by D; a toothed wheel 2, fixed on the shaft of 1; a toothed wheel 3, gearing with 2; a toothed wheel 4, fixed on the shaft 5 (on which 3 also is fixed), and revolving with 3; a toothed wheel 6, gearing with 4; and a connecting-rod 7, which connects the wheel 6 with the automatic operating mechanism controlled by the coins introduced into

the meter. This mechanism is contained in a chamber entirely separate from the chamber under B, except that there is an aperture in the wall of the chamber, through which the connecting-rod 7 passes into the automatic mechanism portion. Of the mechanism just described, the price-changing gear consists of the toothed wheels 3 and 4, the spindle 5 carrying these wheels, the thumb-screw 8 on the end of 5, and a curved slot 9 in the plate supporting the shaft 5, the centre of the curve of which slot is that of the wheel 6. The changing action is effected by removing the thumb-screw 8, taking off the wheel 3, substituting for this wheel one of a different size, then shifting the shaft 5 along the slot 9 until this wheel meshes properly with 2, then putting on the thumb-screw 8 again, and tightening the whole up into position. The cover B is detachable from the body A in the usual way—that is, its connection with the body is by flanges E, and catches on the cover, and with a screw F passing through same, and screwing into a boss or plate on the upper edge of the body. The head of the screw is closed in at the side by a cup; and when the meter is permanently closed, the head is covered and the cup filled with sealing wax or the like, and sealed in the usual way. Thus, without breaking the seal, entrance cannot be had to the gearing wheels just described.

Fig. 1.

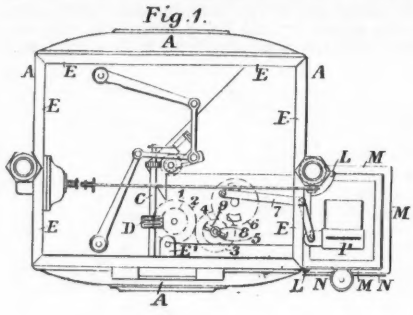


Fig. 5.

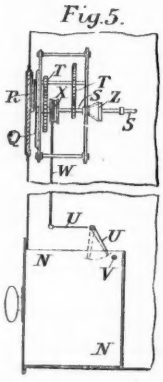


Fig. 2.

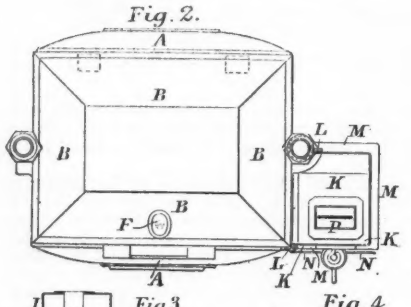


Fig. 3.

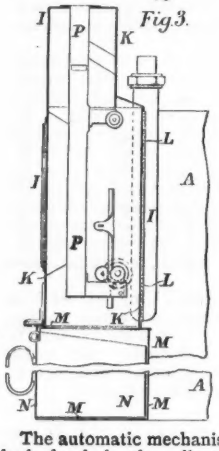
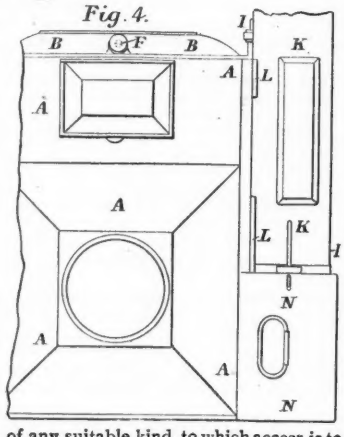


Fig. 4.



The automatic mechanism, of any suitable kind, to which access is to be had only by the collector (and which is entirely separate from the meter chamber containing the price-changing mechanism), is shown at I. It is enclosed in the case K, secured to the side of the meter by sliding beaded joints L, which can be slid off and on the meter body vertically by this joint. Below K is a fixed casing M, in which is disposed the coin-draw N. The case K is locked and sealed in position with the casing M through a cupped projecting part thereon, and by an eye fitting into the cup, which is filled with sealing wax in the closed position, and thus sealed. The coins are introduced into the automatic mechanism in K through a slot in the top of the coin-tube P; and having operated in the mechanism, they fall into the drawer N, after the amount of gas represented by them has been consumed.

In fig. 5 is shown the means for indicating the value of the gas which has been passed by the meter. It consists of a face or dial Q, with numerals 1 to 12 upon it, and in connection with which two indicators or fingers are worked. The short finger R is used for the indication of shillings and the long finger pence; the former being driven at one-twelfth the rate of the latter. The pence finger is mounted on the shaft S, which is directly driven from any moving part of the meter; while the shillings finger is driven by an ordinary form of toothed decreasing gearing T, and is mounted on a hollow sleeve fitting loosely on S. When the cash is removed, and the cash-receptacle returned to its position, the fingers are put back to zero (over the numeral 12) automatically, by a lever U, a pin or bar V on the drawer N, and a cord W connected with a pulley X fixed on the sleeve. Assuming the zero position of parts to be as shown, the position of the lower arm of the lever U would take that shown in dotted lines in the drawing. Then, when the drawer N is pulled out, the pin V merely lifts up the lever U without actuating the hands; and the lever drops to the position it stood in. But when the drawer is pushed in, the pin V comes in contact with the end of the lever U, and actuates it through the cord W rotating the wheel X, and moving the finger indicators back to the zero position. By the further movement inward of the drawer, the pin V slips past the end of the lever, and leaves the parts in the position shown. But before this point is reached, the cord W will have become tight, owing to the short finger R having come up to the stop Y upon the face Q; but the continued movement of the lower part of the lever U is allowed for by making the upper part of it a spring arm, which will give when the other end is pressed back by the pin V. In this zero setting action, the backward movement of the fingers and mechanism is afforded by the spring-pressed friction-coned driving clutch Z on the shaft S, which drives the mechanism of the money indicator, but which slips in the action of setting the fingers back to zero.

Gas-Engines.—Rogers, J. E., of Smethwick. No. 24,792; Dec. 27, 1895.

The general construction of this engine is the same as the "Otto"—having tube-ignition. The improvements specially relate to methods of constructing the bevel gear for driving the valve gear; also the valve gear for admitting, exhausting, and governing the gases for driving the engine, with an arrangement for supplementary exhaust.

The bevel gear is with a shrouding or plain part turned true on the pitch line of the bevel gear, so that, when they were running, these plain parts would bear against each other, which would be made certain by a spring arranged between collars on the shaft driven by the bevel gear for working the valve gear, and made to work with a minimum of friction by arranging them as a ball bearing.

The shaft that is driven by the bevel gear is continued to the end of the cylinder behind the piston; and on the end of it are fixed the cams for operating the valve gear. The valves for admitting, exhausting, and governing the explosive mixture are arranged in boxes on the cylinder cover; and motion is given to them by the cams through gearing.

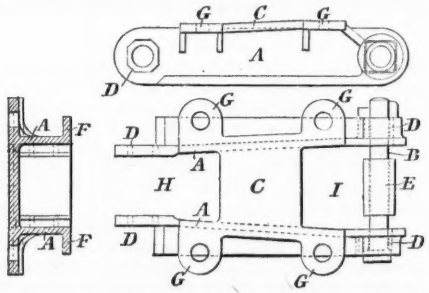
The gear for operating the valves is the same in principle as a "tee-bob lever"—that is, a lever in design similar to the letter T, but arranged thus ⊢. The central leg of the lever is modified to take up the movement of the cams; the fulcrum of the lever being at the point of junction of two lines, so as to transmit the movement of the cams through the arms above and below as required, and having one of its arms lengthened to carry a governor similar in design to that described in patent No. 15,737 of 1885. The supplementary exhaust would, however, be arranged on top of the cylinder in the horizontal type of engine instead of underneath.

Gas Cooking-Stoves.—Yates, H. J. (Arden Hill and Co.), of Aston, Birmingham. No. 389; Jan. 7, 1896.

This invention has relation to detail improvement in the bottom and top burners of gas cooking-stoves, and has for its object "to simplify the fitting or setting in position of the same without the employment of any loose attachments." The claims made for the invention being: 1. In the loose bottom burners of gas cooking-stoves, resting one end within a pocket, socket, semi-socket, or equivalent, and supporting the other end or part upon or by a shelf or rest-flange, or by a hole in the end taking over a gas-way nipple. 2. Preventing the loose bottom burners from rocking by flat or broader parts of the burner between pairs of flanges coming upon the sides of the stove. 3. In gas cooking-stoves, means for securing loose bottom burners in position, and preventing them rocking. 4. In the loose top burners of gas cooking-stoves, a method of supporting and fitting them in position. 5. In the loose burners of gas cooking-stoves, making the air-inlets at the sides or at the bottoms near the ends, instead of at the extreme ends, whereby wind-gusts are prevented from directly entering the burners; and also providing the side air-inlets with baffle shields.

Conveyor Chains.—Hack, H., and Giles, H., of Saltley. No. 1251; Jan. 17, 1896.

In one arrangement of link, the two sides of it A are cast together, and connected by a bridge-piece C passing over the top of the links between snugs G, carrying the bolts used to fasten the conveyor-pans upon the links. The opposing sides A of the cast malleable link are thus bound firmly together by a strong plate extending throughout a considerable part of the length of the links. The plate C may, in some circumstances, extend over the whole upper surface of the links; but it is preferred to confine it to the central portion. The links are made as usual, with a male and female end; and the narrow end H between

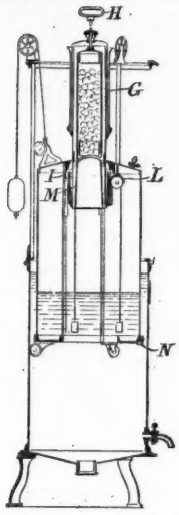


the links is connected, within the wide end I of the next link, by a strong bolt B passing through both links. This bolt has a shoulder, to enable it to be firmly pulled up and held at a proper distance at one end. A nut and cotter, or cotter alone, are arranged at one end of the bolt, and a head at the other. A roller bush E is placed between the links upon the bolt, engaging with the sprocket wells of the sprocket wheels. The bolts may pass through bushes within the respective ends of the link; and these bushes (such as D) may be square, hexagonal, or octagonal, so as to prevent any chance of their rotating in the ends of the link. The bush E, which is intended to engage the sprocket wells, may als

be so arranged on the pin as not to rotate. One method of obtaining this result consists in forming the bush with square ends, or one end square and the other end part square and part round, so as to fit in corresponding apertures in the ends of the links. The bridge-piece C may be dispensed with, and the link then constructed with separate sides in all other respects as shown.

Acetylene Gas Manufacture.—Sardi, V., of Turin, Italy. No. 20,903; Sept. 21, 1896.

This is an automatic and continuous apparatus for the production of acetylene gas from carbide of calcium.



As shown in the engraving, it consists of an iron vessel with a cone-shaped bottom, provided with an exit-tube for discharging the deposit. The vessel is arranged in a floating bell of the usual construction, with a small cock at top to draw off the gas. G is a metal bell fixed in the top of the floating bell, and having a tube H, with an adjustable moveable top and bottom, to contain the carbide of calcium—its surface perforated with holes. To the top of the tube is fixed a metal rod, having a handle attached. I is a cast-iron ring, to which are connected three T-iron bars, fixed at their lower end to a channel-shaped cast-iron ring, carrying three double brackets with wheels. L are three cast-iron hanging brackets, fixed to the ring I, and carrying each a pulley, over which passes a rope attached to balance-weights. M is a bell-shaped conical valve, with a collar or tube secured to it (in which water is contained); and N are three L angle-iron pieces, attached by screws to the bottom of the large bell to carry the ring water-valve and frame inside the bell in such a way that, by taking off the pieces N, the water-valve and its frame can be taken out and cleaned when necessary.

The lower vessel being filled with water up to (say) 3 or 4 inches of the top, and the exit tube and cocks being closed, water is introduced so as to seal the bell G, which is then plunged in the floating bell until the carbide of calcium tube meets the water contained in the lower vessel, and the production of gas commences. The gas causes the main bell to rise, together with the tube containing the carbide, which is thus removed from contact with the water, so that no more gas is produced. When the charge of calcium is consumed, a new supply can be put in without stopping the apparatus, because, when the tube containing the spent charge is taken out, the water-valve M, which has been previously forced down, rises to the position shown in the drawing, and the gas contained in the main bell cannot come out on account of the seal produced. If the apparatus be left charged and idle for several days in such a position that the carbide is out of contact with water, a small quantity of gas will still be produced on account of the evaporation of the water; and the bell will consequently rise gradually and reach the top of the frame, after which the excess of gas that may still be produced will, on account of over-pressure, force its way across the water and expand out.

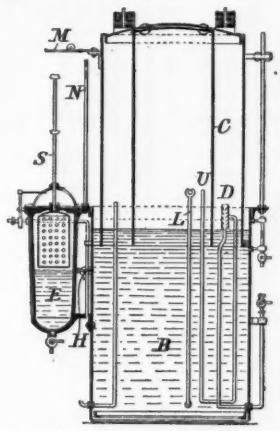
Glow-Bodies for Incandescence Gas-Lights.—Lowenberg, G., of Berlin. No. 21,267; Sept. 25, 1896.

The patentee claims to have discovered that the metals of the gold group—as the oxides of palladium, irridium, osmium, ruthenium, rhodium, and the like—combined with thorium, have a high light-radiating power; and therefore are well adapted for incandescent lighting purposes. He has particularly found that these oxides, and some of them in a prominent degree, when used together with the well-known combination of thorium and cerium, as in the Welsbach mantles, even in a small quantity, will not only fill the place of a similar quantity of cerium, but further also permit a considerable reduction in the general quantity of cerium required as compared to the quantity needed in a combination of thorium oxide and cerium oxide only, to attain the same lighting effect. If, therefore, for instance, to attain a given lighting effect by the ordinary Welsbach mantle there should be needed (say) 98 per cent. of thorium and 2 per cent. of cerium, when substituting for (say) ½ per cent. of cerium a similar quantity of oxide of rhodium, in accordance with this invention, the quantity of cerium required to attain the same lighting effect will be reduced from 1½ per cent. (which would be the quantity in case of a mere substitution) to 1 per cent.—*i.e.*, to nearly one-half.

Acetylene Gas Generators.—Kon, S., of Warsaw, Russia. No. 21,468; Sept. 28, 1896.

This invention relates to the generation of acetylene gas in apparatus regulated automatically by a gasholder bell; the gas being "mixed with air in a safe manner before it passes into the main or service-pipe."

The acetylene flows from the generating vessel E into the annular space in the bell, guided in the receptacle B filled with water. The generating vessel receives its charge of water from B through the pipe H. The carbide is charged into a perforated trough or basket, suspended on a rod S. At the bottom of the vessel E, there is provided a cock for d'scharging residual matters.



To automatically regulate the generation of gas to correspond with the consumption, the rod of the carbide-trough is provided with two stops or projections, and the bell is fitted with a regulating device M; while a corresponding or co-operating disengaging device N is provided on the vessel. The regulating device has two spring fork-arms, kept together by a spring. The arms bear against the lower stop, so as to push the rod downward; or they engage with the upper stop from underneath, so as to raise it. In the former case (which occurs when the consumption of gas is considerable), the carbide-trough is immersed in the water, so as to cause the generation of gas to take place anew; in the latter case, when the bell is at a certain height so that there is a sufficient quantity of gas in the holder, the trough is raised out of the water. The disengaging device has in this connection the function of spreading apart, by means of its wedge-shaped end, the spring arms of the regulating device, when the rod has arrived at the end of its stroke. This causes the arms to release the stop, and allow the bell to rise still higher, while the gas continues to be generated.

For the purpose of mixing the acetylene gas with air, which, says the patentee, is "of great importance for the use of the gas for illuminating, as also for heating and motive power purposes," the bell carries in its interior an air-cylinder C, which draws in air through the pipe L when the bell rises, and allows it to escape through the pipe U into the annular space, where the air becomes mixed in the nozzle D with the acetylene gas.

Treatment of Carbide of Calcium.—Létang, M. P. E., of Paris. No. 21,572; Sept. 29, 1896.

This invention is destined to facilitate the use and the handling of carbide of calcium in its practical application for the manufacture of acetylene gas.

Common carbide of calcium, says the inventor, has the defect of being very sensitive to the action of dampness or of steam. Moreover, it leaves as a residuum a layer of damp and solid lime, which cannot pass through the openings of the carbide receptacles of the acetylene producing apparatus. These two defects result in keeping up the evolution of the gas long after the carbide ceases to be in direct contact with the water. To remedy these defects, it is proposed to cover the pieces of carbide with a protective coating or paint, consisting chiefly of glucose, to which are added petroleum and carbonate of lime in powder. The following is the formula for the paint:—

Glucose	55 parts.
Petroleum	5 ,,
Carbonate of lime in powder . .	40 ,,

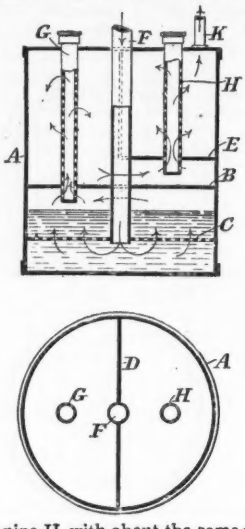
Instead of glucose, any other chemical capable of dissolving or liquefying lime may be employed—for instance, sugar in either a crude or refined state, lactose, honey, mannite, maltose, dextrine, and the like—in short, all saccharine substances, saccharates, and sucrates. On the other hand, for petroleum, the use of which is to preserve the carbide from the action of steam or moisture, there may be substituted vaseline, terebinth, varnish (made with shellac, rosin, india-rubber, or gutta-percha), or the like—in short, any chemical capable of forming an impermeable coating. Powdered carbonate of lime, which is of secondary importance in the mixture, may be replaced by chalk, talc, sulphur, fine sand, and the like.

Carburetting Air.—Köhler, A., of Hamburg. No. 21,667; Sept. 30, 1896.

This invention relates to "a construction of apparatus and selection and arrangement of materials specially arranged therein, for the purpose of carburetting air forced through the apparatus, and thereby producing a combustible gaseous fluid, specially adapted for illumination."

In the vertical section and plan of the plant on p. 1238 a vessel A (preferably cylindrical) is shown, with a lower compartment separated from the upper part by a horizontal partition B; and in this lower compartment, there is fixed a diaphragm C of wire gauze or finely perforated sheet metal. The upper part is divided into two compartments by a vertical partition D and a horizontal partition E. A central pipe F extends down to nearly the bottom; while a laterally perforated pipe G extends through the partition B, and a laterally perforated pipe H through the partition E—a pipe K forming the outlet at the top. The spaces above the partition B surrounding the pipes F G H, are

filled with porous or fibrous material, such as wood wool. The lowest compartment is charged with liquid, which is a mixture of 600 to 700 parts by weight of benzene, with 1200 to 1400 parts of petroleum, boiling at 120° C. The pipe G is charged with 15 to 20 parts of camphor



in granules; and the pipe H, with about the same quantity of naphthalene in granules. Air forced by a pump or blower down the pipe F, bubbles through the liquid in the lower compartment, ascends the pipe G, passing through the camphor, and issues by the lateral perforations into the fibrous material. Thence it ascends the pipe H through the naphthalene and the lateral perforations; and having thus become carburetted, it passes away by the pipe K for use in any heating or illuminating purposes.

APPLICATIONS FOR LETTERS PATENT.

27,824.—Burgess, T., Bennett, C. H., and Burgess, J. J., "Application of acetylene gas for lighting motor-cars, railway coaches, and domestic lamps." Dec. 7.

27,827.—Clay, W. R., and Walmsley, B., "Supports for incandescent gas-burners." Dec. 7.

27,912.—Stott, J., "Lamp globes and chimneys." Dec. 7.

27,945.—Holmes, T. & G. S., Stewart, R. W., and Barnes, R. T., "Producing and burning inflammable gas." Dec. 8.

27,979.—Thomson, T., "Driving, controlling, and regulating motive power from gas or oil engines for various purposes." Dec. 8.

28,030.—Holmes, W., "Improvements in or relating to the flow of liquids in pipes and the like." Dec. 8.

28,035.—Kitchin, F. H., "Equalizing and rendering non-concussive the power generated by oil and gas motors." Dec. 8.

28,083.—Feuillette, E. J., "Generating acetylene gas." Dec. 8.

28,089.—Elphick, O., "Water-waste preventers." Dec. 8.

28,122.—Clarke, A., "Burners for incandescent gas lighting." Dec. 9.

28,135.—Austin, H., "Igniting vapour or gas charges of motor engines." Dec. 9.

28,155.—Forster, J. D., "Apparatus for prepaying gas supply." Dec. 9.

28,194 —Llatas, C. de E., "Burners for acetylene gas." Dec. 9.

28,202 —Taylor, W. F., "Gas and other engines." Dec. 10.

28,206.—Fowler, T. R., "Acetylene gas generator, purifier, and container." Dec. 10.

28,215.—Foster, H., "An appliance by which the mantle of an incandescent gas-light, along with its supports and the chimney, may be removed." Dec. 10.

28,284.—Clarke, E. R., "Internal combustion engines." Dec. 10.

28,302.—Boult, A. J., "Generation of acetylene gas." A communication from L. Serres. Dec. 10.

28,322.—Twynam, T., "Recovery of ammonia from producer gas, blast-furnace gas, and other gases." Dec. 11.

28,338.—Rowbotham, W., "Explosion engines." Dec. 11.

28,371.—Birnbaum, T., "Apparatus for use in burning illuminating gas." Dec. 11.

28,372.—Coney, F., "Valves or cocks for the prevention of frost bursts." Dec. 11.

28,392.—Boardman, F., "Apparatus for actuating gas-valves controlled by the aid of electrical energy." Dec. 11.

28,402.—Wilson, H. W. V., "Gas or hydrocarbon vapour engines." Dec. 11.

28,425.—Marks, H. T., and Todman, J. T., "Generating gases for illuminating and other purposes." Dec. 11.

28,432.—Holmes, T. & G. L., Stewart, R. W., and Barnes, R. T., "Producing inflammable gas." Dec. 12.

28,491.—Denayrouze, L., "Burners for incandescent gas-lights." Dec. 12.

28,496.—Cars, B., "Gas-brackets." Dec. 12.

28,505.—Lamb, J. H., "Explosion engines." Dec. 12.

28,514.—Tomlinson, T., "Internal combustion engines." Dec. 12.

The Poll on the Lowestoft Gas and Water Works Purchase Question was declared on Monday last week. The result was: For the purchase, 2001; against, 895—majority in favour, 1106. This very definite pronouncement by the ratepayers was not anticipated; and therefore the Corporation will be encouraged to push forward the Bill sanctioned at the meeting of the Town Council on the 8th inst., as reported in the last number of the "Journal."

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Finding of Security by Gas and Water Officials.

Sir,—To those officials in the gas and water professions who are compelled by their employers to find security, the present time (being the period in which the annual premium is generally paid) will bring to mind the payment of money for which no adequate recompense is received. Every year a fairly considerable sum, which in most cases can be ill afforded, has to be paid by officials who are, to use a homely phrase, "as safe as the Bank of England," to help to swell the dividends of the company to which they pay.

The idea has occurred to me that all this can be remedied. There are two courses which might be adopted, either of which would prove beneficial. The first is the system under which the Post Office officials find security; and it is worked very economically and effectively. Each appointed official has to take up a share, and to pay an entrance fee. An official from whom I derived my information, informed me that he had to find security for £1000. Instead of paying £5 a year premium regularly, as I should have to do, he paid 5s. entrance fee for each £100, and 5s. as share money for each £100—altogether £5—for the payment of which three years is allowed. This is all he has to pay—no annual premium; and a certain portion, if not all, also recurs to him at some future time. The other plan is for all the officials to pay to one Company, and thus get a great reduction on present rates.

The former system, as can readily be seen, is by far the better. A Board of Management could be constituted similar to the postal; and if every official would do his utmost to make it a success (for it is for his own welfare), it could be put on a good sound basis.

I should be glad to see the opinions of others expressed in your valuable publication; and if managers and secretaries would call their assistants' attention to this, I should deem it a great favour.

Gas Offices, Coventry, Dec. 19, 1896. J. Holt.

A Remedy Wanted for Thick Tar.—A "City Manager" writes: Will any of your readers help me to a satisfactory method of dealing with thick tar? Our small works are fitted up with furnaces on the regenerative system, with tar separator. We work at a moderate heat, and it produces a tar too thick for our customers. We should therefore be much obliged for any information as to how this could be remedied.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, Dec. 16.

(*Before Mr. Justice* Stirling.)

Incandescent Gas-Light Company, Limited, v. Liebermann.

Mr. Terrell, Q.C. (with him Mr. Walter) said this was a motion for an injunction to restrain the defendant from infringing the plaintiffs' patents. He had evidence proving the purchase, at 33, Jewry Street, of mantles which were a clear infringement; but defendant had made an affidavit in which he stated that he was not selling mantles, that he had nothing to do with the business, and that it was carried on by someone else. The plaintiffs did not believe this; and they asked to be allowed to cross-examine the defendant. Of course, their witnesses could also be cross-examined if the defendant desired to do so.

Mr. Eustace Smith objected, on the ground of unnecessary expense. He said the point was a very short one—viz., whether or not the defendant had sold the mantles. He was willing to concur in any application to expedite the trial.

Mr. Terrell said he had already obtained injunctions against Altmann and Boehr; and a motion was now pending against the National Incandescent Lighting Company in respect of the same mantles.

Mr. Smith thought it would be a pity to put the parties to the expense of cross-examination.

Justice Stirling asked if they were willing to treat the motion as the trial of the action, and have it decided on the cross-examination of witnesses upon the present affidavits. If so, he would take the case on the first Wednesday in next sittings.

Mr. Terrell said he must ask for an injunction in the meantime. As the defendant said he was not doing what was complained of, the injunction would not hurt him.

Justice Stirling said he could not grant an injunction until he had heard the case.

It was arranged that Counsel should consult their clients, who were not in Court at the time, as to whether they were willing to treat the motion as the trial. If so, the case was to come on on the 13th of January; if not, the order for cross-examination was to go.

Thursday, Dec. 17.

The matter was before his Lordship again to-day.

Mr. Terrell stated that, having consulted his clients, he proposed to take the ordinary order for cross-examination.

Mr. Smith strongly pressed his Lordship to dispose of the matter once for all. He said there was only one case of infringement alleged against the defendant, and this could be settled in five minutes. He thought it was oppressive to cross-examine witnesses when the whole case could be quickly decided by treating the motion as the trial.

Justice Stirling said, as the parties could not agree, the order must go for cross-examination. The question of costs would be dealt with afterwards.

Friday, Dec. 18.

(*Before Mr. Justice* CHITTY.)

Incandescent Gas-Light Company, Limited, v. National Incandescent Lighting Company.

This was a motion for an injunction to restrain the defendants from infringing the plaintiffs' patents.

Mr. TERRELL, Q.C., appeared for the plaintiffs; Mr. BYRNE, Q.C., and Mr. EUSTACE SMITH represented the defendants.

Mr. TERRELL said a gentleman named Alfred Boehr had entered an appearance, and had filed an affidavit in which he said he was the National Incandescent Lighting Company. On the part of the plaintiffs', there was an affidavit of Mr. Gutch and Mr. Burney, in which they set out the purchase of certain mantles, which were handed to Mr. Ballantyne for analysis. Mr. Gutch also stated that the two patents in respect of which the injunction was sought to be obtained had been contested twice; and certificates of validity given in both cases. With regard to the 1886 patent, an action had been brought against the Meteor Company, in which judgment was given by Mr. Justice Romer, who held that mantles composed for the most part of thorium constituted an infringement. Then there was the affidavit of Mr. Ballantyne, who had analyzed the mantles bought from defendants. He showed that they contained oxide of thorium 97·05 per cent.; oxide of the cerium group, 2·17 per cent.; and oxide of calcium, 0·77 per cent.—making a total of 99·99. This was substantially the same composition as the mantle which was in dispute in the Meteor action, and which had been held to be an infringement. There had already been a motion against Mr. Altmann, one of the servants of Mr. Boehr; and Mr. Justice Kekewich had granted an injunction against him. Mr. Boehr in his affidavit said that he had had read and had had explained to him the affidavits of the plaintiffs. He denied some of the statements made therein; but it appeared to him (Mr. Terrell) that he really admitted the infringement. He said he carried on business as the National Incandescent Lighting Company, at 33, Jewry Street; and that all the mantles he sold he received from Germany, and only burnt them off in England. The manufacturing business was not carried on by Liebermann on the premises. He said the mantles referred to in Mr. Gutch's affidavit were not mantles sold by him; that as to three mantles, he had not sold any since the beginning of October; and that he had sent a mantle to be analyzed, but had not yet received the report. The mantles he was now selling were made under Kortwich's patent, No. 2000 of 1896. This specification was for mantles made of thorium and cerium; so that it absolutely agreed with the analysis of Mr. Ballantyne. Kortwich's patent specified: Thorium, 22·25 parts; lanthanum, 2·75 parts; cerium, 1·5 parts; yttrium nitrate, 0·35 part; chloride of antimony, 0·75 part; zirconium nitrate, 2 parts; pyro-tartaric acid, 2 parts; and water, 70 parts. This, he submitted, substantially agreed with the mantles analyzed by Mr. Ballantyne. Every one of the substances named was mentioned in the plaintiffs' specifications of 1885 and 1886, and was an absolute infringement, as held in the judgment in the Meteor case.

Mr. BYRNE said the defendants had purchased in Germany a number of mantles manufactured in accordance with Kortwich's specification; and it seemed to him that it did not agree at all with the analysis deposed to in the present case.

Mr. TERRELL said it was substantially the same if the 70 per cent. of water were subtracted.

Mr. BYRNE pointed out that there was no chloride of antimony at all, nor any pyro-tartaric acid. There were used under this specification a great number of ingredients which were not mentioned in the analysis. He did not understand what evidence there was to show that Kortwich's invention was an infringement of the other. It was a different kind of composition altogether; and he said it was not a case for an interlocutory injunction.

Justice CHITTY remarked that what was analyzed was what was said to be sold.

Mr. BYRNE supposed that was so.

Justice CHITTY said it must be. He understood there were three samples left, one of which had been sent to be analyzed; but they had not yet received a report. It seemed a little remarkable that the analyst could not make an analysis within nine days.

Mr. BYRNE said the plaintiffs seemed to take a long time over their analysis.

Ultimately, the injunction was granted upon the ground that Mr. Justice Kekewich had already held a mantle of the same composition to be an infringement.

Incandescent Gas-Light Company, Limited, v. Marsden.

Mr. TERRELL, Q.C., again appeared for the plaintiffs.

Mr. ISRAEL DAVIS, who represented the defendant, in reply to his Lordship, said he believed there was a good defence to the action. In this case, the plaintiffs purchased six mantles from the defendant. The first three they did not care to proceed upon, because they were clearly not infringements. Then they bought three others, and proceeded upon them. The defendants said they disputed the analysis; but if the mantles were an infringement, he was willing to undertake not to sell any more of that parcel. But they wished the three mantles to be produced so that they might be examined and tested. They asked for this so long ago as the 7th of December, but the plaintiffs would not produce them; and only that morning he received a letter saying that they would produce them in Court. Of course, this was of no use for the purpose of analysis.

Justice CHITTY observed that the plaintiffs said they had evidence that these three mantles were infringements.

Mr. DAVIS said they had filed an affidavit that one of the three was an infringement; and he had not been able to meet it because the mantle had not been produced until that morning.

Justice CHITTY pointed out that the defendant was liable to an injunction if he had only sold one.

Mr. DAVIS acknowledged that this was so; but he said he hoped to prove that it was not an infringement on analyzing the other two. He asked that the motion should stand over for the analysis to be made. The plaintiffs had not given the defendants the usual facilities.

Justice CHITTY said patentees were not generally disposed to offer facilities to infringers.

After some further discussion,

Justice CHITTY said it seemed a clear case; and he must grant an injunction.

Mr. DAVIS said it was often a great injury to a business to have an injunction; and he would give an undertaking in the terms of the notice of motion, but without prejudice to any question.

Mr. TERRELL said in that case he should presume that the motion would stand till the trial.

Justice CHITTY said no; there would be no order, except that the costs be costs in the action.

In three other cases, in which the defendants were Taylor, Hendrik, and Kipping, there was no appearance on their behalf, and injunctions were granted.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

Monday, Dec. 14.

(*Before Mr. Justice* CHARLES.)

Yorkshire and Lancashire Water-Gas Company, Limited, v. Arnot.

This was an action to recover the sum of £65, being an instalment of 10s. per share upon 130 shares, with 10 per cent. interest on this amount to the date when the shares were forfeited, and after that date interest at the rate of 5 per cent. until judgment. The defendant did not admit the making of the call; he denied that it was legally made, or that the persons who made it were competent to do so; and, further, he denied that a transfer cast any obligation upon him to pay the call.

Mr. MARTELLI (with him Mr. H. D. GREENE, Q.C.) said the Company was incorporated in 1889 under the name of the Yorkshire Water-Gas Company. In 1892, the name was changed to the Yorkshire and Lancashire Water-Gas Company. In April, 1889, the Company issued a prospectus inviting applications for shares in the capital of £150,000. The defendant's predecessor in title applied for the shares in question; the defendant acquiring them by transfer on Oct. 25, 1890, to secure a debt. On May 18, 1893, the Directors required payment of 10s. per share; and application was made for this sum. A second and a third application were made to the defendant without success; and in November, the Directors forfeited the shares. The Company was now in voluntary liquidation; and the Liquidator had issued a writ to recover the amount. The Articles provided that the holder for the time being of the shares should be liable to pay the calls, with interest; and that, notwithstanding forfeiture, the member should pay all calls owing upon or in respect of such shares.

Mr. BUTCHER, for the defendant, argued that, in order to find his client liable, the Company must prove the existence of a contract to pay the money. This was not a call made by the Directors; but was the balance of a sum payable on allotment, or the instalment of a call for which, no doubt, the transferor would be liable. The provision in the Articles referred to "calls," and not to a sum due under the original contract of allotment.

Justice CHARLES said he was of opinion, having regard to the terms of Article 34, and the 16th section of the Act of 1862, that defendant was liable to pay the instalment in question. Judgment would therefore be entered for the plaintiffs for £78 17s. 6d., with costs.

Gas-Engines on the Hire-Purchase System.

In the Court of Appeal last Saturday, before the Lord Chief Justice and Justices Lindley and A. L. Smith, judgment was given in an appeal from a decision of Mr. Justice Kekewich in the case of Hobson *v.* Gorringe. The question involved was as to the right of the vendor, under a hire and purchase agreement, of a gas-engine which he had allowed the purchaser to affix to his land, to recover possession thereof, on the failure of the purchaser to pay the stipulated instalments, as against a mortgagee in possession of the land. Mr. Justice Kekewich decided in favour of the defendant, the mortgagee in possession; and their Lordships, holding that, as a fixture, the gas-engine had ceased to be a chattel, and had become a part of the freehold, affirmed this decision, and dismissed the appeal, with costs.

Stealing Money from an Automatic Meter at Winchester.

Henry Iles was recently charged, before the Winchester City Bench, with stealing 3s. from an automatic gas-meter at the Old Market Inn, where he was employed. Mr. C. S. Wooldridge, Clerk to the Water and Gas Company, prosecuted. Mr. W. H. White, an Inspector of the Company, gave evidence as to clearing the meter till on the day preceding the theft; and, on examining it again the following day, he found the lock had been tampered with, and the till still empty, while, according to the reading of the index, it should have contained 3s. Three marked shillings, which were placed in the meter by the landlord, were produced by Police Superintendent Felton, who had discovered them in one of prisoner's boots. Iles pleaded guilty, and was sentenced to 14 days' hard labour. The Bench expressed an opinion that the locks to the meters were not strong enough.

Loughborough Corporation Water Bill.—The Loughborough Town Council yesterday week fixed at £65,000 the amount of the borrowing powers to be sought under the Bill which they are promoting for water-works purposes.

A Prosperous Municipal Water Undertaking.—At the meeting of the Dover Town Council last Thursday, it was reported that the profit realized on the water supply of the town for the past year amounted to £2000; and it was ordered that this amount should be transferred to the general district fund. This will relieve the rates to the extent of 3d. in the pound.

MISCELLANEOUS NEWS.

CONTINENTAL UNION GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, 7, Drapers' Gardens, Throgmorton Street, E.C.—Mr. ARTHUR LUCAS in the chair.

The SECRETARY (Mr. F. W. Himing) read the notice convening the meeting, and subsequently the report of the Directors and the accounts for the year ending June 30. The former was as follows:—

It is with deep regret that the Directors have to record the great loss the Company sustained by the death of its late Chairman, the Right Hon. Sir Julian Goldsmid, Bart., M.P., which event occurred on Jan. 7 last. The vacancy thus caused on the Board has been filled by the election of William Townsend Shorthose, Esq., who, for many years, has been a large proprietor in the Company, and also in the Union des Gaz.

The Directors have to report that the number of consumers on the Company's books on June 30 last at Messina and Montargis—the two stations owned directly by the Continental Union Gas Company, Limited—shows an increase of 469; being 200 more than the increase of the preceding year. The increase in the quantity of gas sold at these two stations is 7½ per cent. The bad debts incurred and written off have amounted to about £35.

The expenditure on capital account at Messina includes about £1000 for telescoping one of the gasholders, £180 for a new shed, and about £1050 for new mains, services, and public lamps.

The Directors considered it expedient to purchase a building (which was offered to them on favourable terms) at Messina, and in which they have been able to group all the various services in that town, while at the same time retaining the ground floor for an electric light station.

The electric light installation referred to in the last report has not yet been appreciated by the inhabitants of Messina; and the result of the ten months' working to June 30 last shows a loss. The net cost of this installation—excluding the building—came to £2900. The erection of an electric light station by a competing Company at Montargis, has had the effect of taking away several of the Company's consumers, which, however, has been partly compensated for by the acquisition of new ones in the adjoining hamlet of Chalette.

As to the stations of the Union des Gaz, this Company has succeeded in renewing the concession for the lighting of the town of Modena for twenty years from June 30, 1899—the date on which the old concession would have expired. Considerably lower selling prices of gas have, however, had to be consented to. They have also renewed the concession with the Commune of La Celle St. Cloud, near Paris, for 21 years from December, 1904. The concession for the town of Parma expires on June 1 next; the Company having been unable to obtain a renewal thereof.

The average length of the concessions of all the towns lit by both Companies is now 29 years.

The Government tax in Italy, mentioned in the last report, came into force on Nov. 1, 1895. This tax is payable to the Government by the Company, who collect the same from the consumers.

The total amount spent on capital account by the Union des Gaz for works finished during the year under review was about £39,000—being for regenerator furnaces, purchase of ground, new stores, &c., at Milan; regenerator furnaces, enlargement of offices, purifier-house, and new gasholder at Rueil; "Standard" washer, new station meter and boiler at Genoa; new purifiers at Nimes; new boilers, distillery, pumps, "Standard" washer, and new building for same at Roanne; new boiler, pumps, exhausters, and water-tank at Strasbourg; and mains, services, and lamps at the thirteen stations generally.

The following statistical information relating to the working of the Union des Gaz stations is, as usual, given here: There has been a net increase of 513 in the number of public lamps lit by gas; while the number of private consumers on the books of the Union des Gaz on June 30 last shows the satisfactory increase of 5564—making a grand total of 82,170 consumers supplied by that Company at their 13 stations.

The quantity of gas sold for all purposes shows an increase of about 4½ per cent. The average cost of coal has decreased nearly 6d. per ton; but recent advances in freights point to an increased cost of coal during the current year's working. The net value of the coke sold has increased to the extent of 4½d. per ton. The net value of tar has also slightly increased; whereas the value of ammoniacal liquor shows a decrease of 5d. per ton of coal distilled.

The bad debts incurred and written off profits amount to £710; being a trifle more than in the preceding year.

Reverting to the accounts of the Continental Union Gas Company, it will be seen from the balance-sheet that the Directors have, during the year under review, reduced their holding of Anglo-Romano gas shares by £6201, and have also sold £9594 Consols and £20,106 Local loans. These operations have resulted in a considerable profit. They have employed the proceeds of the above, together with cash which was lying on deposit at low rates of interest, in subscribing for about £60,000 of Union des Gaz bonds at par, bearing interest at 4 per cent., redeemable by annual drawings at par.

After making the usual charges, the net profits of the Continental Union Gas Company, Limited, for the year ending June 30 last amount to £116,258 11s. 11d. The available sum to the credit of general revenue is £154,176 19s. 6d., out of which the Directors recommend a dividend at the rate of 13 per cent. per annum. The holders of 7 per cent. preference stock participate *pro ratâ* in all ordinary dividends exceeding 10 per cent., and will therefore receive 10 per cent. for the year. It is proposed that, after deducting the interim dividend paid in July last of 5 per cent. on the ordinary and 3½ per cent. on the preferential stock, the balance of 8 per cent. on the former, and 6½ per cent. on the latter, all free of income-tax, should be paid on Jan. 4 next. The amount carried forward to the new account will be £37,976 19s. 6d.

The Director who retires by rotation is W. T. Shorthose, Esq.; and the Auditors (A. T. Eastman, Esq., and I. A. Crookenden, Esq.) also retire All these gentlemen, being eligible, offer themselves for re-election.

The CHAIRMAN said it was fitting, before proceeding to the business with which they had to deal, that he should refer to the sad event of January last—the death of Sir Julian Goldsmid. In these days, in the hurry of events and the crush of the crowd, men were very apt to be forgotten; but he did not think their late Chairman would be forgotten. They would remember for some time to come that in him they had a leader who was devoted to their interests—an able man, who constantly sacrificed his health and his inclinations on behalf of those for whom he worked; and his comparatively early death was due in great measure to his earnest attention to this and other businesses in which he was engaged. The proprietors, he was sure, would share with the Directors their feelings of sorrow for his death and respect for his memory. In the place of Sir Julian Goldsmid, they had elected Mr. Garey, who was one of the oldest members of the Company, and who was at work for the Company in which they were so much interested long before the existence of the Continental Union Gas Company. He (the Chairman) was convinced that, to a great extent, the success of their Company was due to Mr. Garey's untiring efforts in the economical management, and to his great technical knowledge of the conduct of gas-works. Unfortunately, their Chairman did not feel equal that day to addressing the shareholders; and at his and the Board's request, he (Mr. Lucas) had undertaken the duty. When he began to consider the remarks he should make that day, he thought, with a sigh of envy, of those chairmen of English gas companies who had only to deal with one set of accounts and the statistics of one town, while he had two sets of accounts and the statistics of fifteen towns to comment upon. The answer to this would be that there were many chairmen who would wish to have the same story of prosperity to tell as he had. They had heard by the reading of the report and accounts that there was an increase of £230 in the net profits; and that the Directors proposed to pay the same dividend as last year, and carry forward £37,976, as against £37,918 last year. This was, on the whole, a satisfactory statement. They had also heard from the report that at their own two stations—Messina and Montargis—there had been an increase during the twelve months of £715, while in the previous year there was a decrease of £1084; but it would be remembered that this decrease was due to an earthquake which shook Messina to its foundations in the course of 1895. To give the shareholders some idea of the effect of this on their property, he might tell them that the leakage in the town amounted now to 18·88 per cent.; and to those who were acquainted with the work of gas supply, this was an enormous percentage. In fact, it was a wonder they were able to convey gas through the mains at all. While speaking of Messina, he might mention that they were about to make a reduction in the price of gas of 2 centimes; and this would come into force on Jan. 1. The report also stated that the Company had gone in for a small installation of electricity at Messina; and the reasons for taking this step were many. The town wanted electricity, and others also wished for it. The Company wished to oblige the town; and they put up a small installation. Scientifically it had been a success; financially it had not. Now the inhabitants had electricity at their command, they had not been eager to adopt it; but it had been utilized in the public places. The Directors had hoped that they would at least have made a small profit; but they had not as yet been able to do so. However, for motives of policy, they would go on; and he trusted that in the future the installation would answer the purpose of obliging the Municipality, because that was their chief reason for undertaking it. Passing to the affairs of the Union des Gaz, he said, for the information of new shareholders, they held 37,000 out of the 50,000 shares in the Company, which had a capital of a million sterling; and they were large holders of 4½ and 4 per cent. bonds. He regretted to say that in the balance sheet of the Union des Gaz for last year, there was (compared with the previous year) a decrease in the profits of £1757. The cause of this he would refer to when he came to deal with the city of Milan. The proprietors had no doubt heard with regret, that they had lost the lighting of Parma. Of course, the Directors did not sit quietly and let the concession lapse. Negotiations had been carried on for a long time with regard to its renewal. They made many concessions; and at last agreed with the Municipality as to the terms—in fact, they considered the matter settled—when the Provincial Council, who had the power to veto the decisions of the Municipal Council, decided to put the concession up to public tender. The result was it was adjudicated at a price which would have made it impossible for the Company to obtain any profit at all; and so they had lost it. However, the profits from Parma were at no time great; and consequently the loss would not be very much felt. Although they had lost this town, they had gained Modena, and had been able to procure an extension of the concession for twenty years. It was true they had obtained this at a sacrifice of the comparatively high price they had hitherto received; but he hoped the increase of business which always resulted from the reduction in the price of gas would largely compensate them for any immediate loss. When last he addressed the shareholders, it was his duty to refer to the State tax in Italy. This tax, though very much to be regretted, had been paid; the Company having the power to recoup themselves in the price of gas at their various Italian stations. But unfortunately a little before the time this tax was imposed, the city of Milan thought fit to tax the gas in the exterior of the city. In order to explain the matter clearly, he must tell the shareholders that they had two concessions in Milan—one in the interior, and one in the exterior. The one in the interior was an exclusive concession; the one in the exterior was not. In the interior, they had, for something like 25 years, paid the municipal tax of 2 centimes per cubic metre. There was no such tax in the exterior; and this was the tax the Municipality had now inflicted. But in the interior they had power under the statutes to reclaim the tax from the consumer; but when the Municipality imposed the tax in the exterior, they said: "You must pay the tax on the total amount of gas sold," and said nothing about the Company's power to recoup themselves. This led to litigation with the town and the consumers; and the result was the Company had to pay the tax to the town, and would have to recoup themselves from the consumers. It was chiefly owing to this friction, and the refusal of many of the consumers to pay the municipal tax at Milan, that the shrinkage in the profits of the Union des Gaz was due. But the troubles did not end there. This taxation—the State tax and the Municipal tax—led, about twelve months ago, to a great demand on the part of the inhabitants of Milan for a reduction in the price of gas. He was speaking that day under great difficulties, because the negotiations that had been going on for the past twelve months were now, he sincerely trusted, coming to an end; and Mr. Hesketh Jones, who had been obliged to leave for Italy by appointment with the Municipality of Milan, would, he hoped, in conjunction with the French Board (with whom the Directors had always been in unanimity on this question), be able to arrive at a conclusion which would be satisfactory both to the inhabitants of Milan and to the shareholders. All this friction might cause in immediate years a reduction in the profits of the Union des Gaz.

There was no doubt a very widespread demand on the Continent for cheap gas; and there were many reasons for it. No doubt the invention of motors, the demand for extra light which was created by the introduction of electricity, and the use of gas for heating, cooking, and many other purposes, had necessitated an enormous consumption of gas; and there was little question that, if the demand continued to increase as it was now doing, gas at a cheaper cost would have to be supplied. While on this subject, he should like to read an extract from a recent address by a very high authority—the President of the Institution of Civil Engineers, Mr. J. Wolfe Barry. He said: "The use of gas in engines and in cooking has made such strides that, in spite of the rapid development of electric lighting, the consumption of gas increases in London. I am persuaded that, with respect to gas as an agent of heat for all purposes, and of light under improved conditions of combustion, its capabilities have only been as yet indicated, and that a great future for it is in store, if only we can have a supply at low prices for these purposes." Cheap gas had been and was the policy of the Board; but, when they went to a Municipality, they always naturally asked for compensating advantages in offering them gas at a cheap rate. He hoped that, though they might have, as he had said, a temporary shrinkage in the profits, it would be largely recouped in time to come. The clouds, he was afraid, were thickening around them; but he thought that, in perhaps three or four years to come, they would again have a very prospering business. They might not be able to pay the shareholders quite so high a dividend as in the past; but he had little doubt that, so long as the concessions of the Union des Gaz lasted, their business would be a sound one. The shareholders might rest assured that the Directors would strive their best to do their duty; and though they might not be able to present them with such a good tale of the prosperity of the immediate future as they had been able to do during so many years, yet he hoped, in time to come, they would not have a bad story to tell. He concluded by moving the adoption of the Directors' report.

Mr. N. E. B. Garey seconded the motion.

Mr. Sparks inquired what had become of the plant at Parma.

Mr. Palmer asked if the Company had a sinking fund in connection with their stations at Messina and Montargis. He noticed that these works stood in their books at £114,000.

The Chairman, in reply, stated that they had sold the whole of the plant at Parma to the incoming contractor on very good terms. As to Mr. Palmer's question, they had a sinking fund for Messina and Montargis; but it did not appear in the accounts. It had been written off capital.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. H. Wollaston Blake, the dividends mentioned in the report were declared.

The Chairman moved, and Mr. F. Tendron seconded, the re-election as a Director of Mr. Shorthose.

The motion having been passed,

Mr. R. S. Gardiner proposed the re-appointment of the Auditors (Messrs. A. T. Eastman and I. A. Crookenden).

Mr. Solomon seconded the proposition, which was adopted.

The Chairman, in moving a vote of thanks to the Secretary, Managers, and staffs of both Companies, mentioned that last spring he paid a visit to the various Italian stations; and he averred that he had never seen works in better condition. At Milan, they had built a gasholder tank entirely by their own Engineers superintending their own labour; and the result, had been great economy to the Company.

Mr. Garey seconded the motion, which, having been heartily agreed to, was acknowledged by the Secretary.

On the proposition of Mr. Eastman, a resolution was passed thanking the Chairman and Directors for their energetic services.

The Chairman responded; and the proceedings then terminated.

SOUTHWARK AND VAUXHALL WATER COMPANY.

The Ordinary Half-Yearly General Meeting of this Company was held last Tuesday, at the Offices, Southwark Bridge Road—Alderman Sir H. E. Knight in the chair.

The Secretary (Mr. Montague Watts) having read the notice calling the meeting, the report of the Directors was taken as read.

The Chairman, in moving the adoption of the report and accounts, said that with respect to the capital account, the £100,000 of "B" debenture stock raised last year was not yet expended; there being £33,202 still in hand. This would carry them on for some little time; and he did not anticipate that they would have to issue any more of the stock until the middle of next year. With reference to the revenue account, he found it rather difficult to make a comparison under the head of "maintenance," because so many extraordinary sums had been brought into the account in consequence of the exceptional frost of two years ago. If, for instance, they took the total in the past half year at £50,000, as compared with £48,800 in the September half of 1895, there was so many items in connection with the frost that they could draw no conclusion from these figures. They had, for example, in this half year £3000 "balance of frost expenditure brought from last account;" and an item of "expenditure on lowering mains, £2667." There was nothing of this sort last year; and therefore they could not compare the totals. There was, however, one item—that of rates and taxes—which they could compare, and, he thought, very profitably. In the present half-year's accounts, this item was £13,604, against £12,077 for the September half of 1895. He had called attention for many years to the constant increase in this item; and in order to give the proprietors a little further information about it, he had had some tables prepared going back to the year 1880. It would interest them to know that for the whole year 1880 they paid £8600 for rates and taxes; whereas for the entire year 1896 they had paid £25,700. These figures would, perhaps, bring more forcibly to their attention what he had pointed out in past years—namely, the enormous rate of increase in this disbursement, and the heaviness with which all new rates and taxes fell on public companies. Under the head of "management," the expenses for the past half year had been £10,499, against £9282 for the corresponding period of 1895, or an increase of £1217. Two or three items alone—stationery, &c., and law and parliamentary expenses—fully accounted for this increase. The law and parliamentary expenses had this year augmented very considerably, owing to their not having been successful in securing the passage of their Bill last session. He would refer to this matter later on. When they turned to the other side of the account, they had to regard it with the greatest possible satisfaction. They found that the allowances for empty houses, &c., were again less than at the corresponding period of last year, having been £4277 against £4586. This item had been constantly decreasing for many half years—a highly gratifying fact, because it showed the correctness on which their basis of charge was made, and also indicated the very satisfactory manner in which their revenue was collected. He did not think any other company could boast, as they themselves could, that they collected more than 99 per cent. of their charges. Out of their large water-rental in the past half year (amounting to no less than £128,000), the allowances for empty houses, overcharges, and bad debts only came to £4277. The water-rents accrued showed an increase of no less than £5835 in the past half year over that of the September half of 1895; proving the inherent prosperity and value of their undertaking, which had shown a constant healthy augmentation in its revenue. The increase in the past half year had exceeded that of any previous six months in their history. Taking the whole twelve months, they found that for the year ended at Michaelmas last, the total of the water-rents was £244,925; showing an increase over the previous year of no less than £9151. This was exceedingly satisfactory to the Directors, and was a reward to them for the attention they gave to the details of the business. It was also satisfactory to them because they knew that they were assisted in working out these details by good, trustworthy officers, who deserved every credit. They carried this time to the dividend and interest account £64,448, compared with £60,713 a year ago, or an increase of £3735. They had now got rid of all the payments they had had to make on account of the exceptional frost alluded to, which had caused between £33,000 and £36,000 to come out of their pockets in the past two years. Nevertheless, their dividend had only fallen back in that period by 1 per cent. After paying £20,391 for interest, which was £1189 more than at this time last year, and after providing for the dividends on the preference stock, amounting to £12,230, they had a balance left applicable for division of £31,134, which enabled them to recommend a dividend of 6 per cent. per annum, which he thought would be considered exceedingly satisfactory under all the circumstances he had described. If they had not had the extraordinary charges to pay for the frost, which they brought over from the previous half year, they would have shown enough profit in the past six months to pay a dividend of 7 per cent. per annum—a fact showing the inherent strength, stability, and value of their undertaking. Some very important matters were referred to in the report, upon which he desired to say a few words. They felt disappointed that the Metropolitan Counties Water Board Bill, introduced by the Government last session, did not pass further than the stages of the House of Lords. They had all looked forward to a satisfactory settlement, in some way, so that the question of the London Water Supply might be dealt with definitely instead of their being left to be harassed by the London County Council and put again to enormous expenses. The ratepayers of the Metropolis were also subjected to heavy costs by the expenses incurred by the Council in their opposition to the Water Companies. With respect to the Bill promoted by the Company, which the proprietors approved at the Wharncliffe meeting last February, it was an honest and proper attempt to bring their undertaking fully abreast of the requirements of the district for all time to come. The Directors had felt strongly—and the proprietors endorsed this view—that it was their duty to place themselves in such a position that there should be no possible doubt as to their capability to supply any quantity of water their district might require, and not to wait until absolute necessity was upon them. Their desire had been to forestall such necessity, and to be prepared for any emergency; and had they succeeded in getting their Bill passed, they would have been in the position he had described. The Water Bills which were referred last session to the Select Committee were met, as usual, with very strong opposition on the part of the County Council, who desired to prevent the Water Companies, if they possibly could, from making themselves equal to the discharge of their duties—in other words, to damage them, and buy up their undertakings cheaply. The Committee had to deal with this opposition week after week; and it was getting very near to the end of the session before the Company's Bill was reached. The Committee, no doubt, had been most anxious to do their duty; and they gave the greatest attention to the many difficult questions brought before them in the previous Bills. He could not, however, help thinking that when the Company's Bill was reached, the Committee were somewhat wearied with their arduous labours; and they came to the conclusion, after hearing the evidence he placed before them—not the whole of their case—that the Bill could be postponed without detriment to the interests of the public. To this opinion, the Directors and proprietors had to bow. It was very unfortunate, however, because he thought the circumstances were such as might have enabled them to make advantageous arrangements; and these circumstances might not occur again. Still, they could look boldly forward to the future; and if any emergency or difficulty arose in consequence of the delay, they could say that it was not the fault of the Company, who had been prepared to raise and expend the capital necessary for placing themselves in an undoubted position. The expenses of the Bill had been paid for out of their revenue; whereas if their application to Parliament had succeeded, the costs incurred would have been a charge on their capital. Notices of Bills proposed to be introduced into Parliament in the ensuing session, for the transfer of the undertakings of the Metropolitan Water Companies, had again been published by the County Council. This body had given notice, not for one Bill for the purchase of all the Companies' undertakings, but eight Bills. Each Bill was for the purchase of one undertaking only; so that the Water Companies might be put to the utmost possible expense. They must have eight sets of Counsel, eight sets of witnesses, and eight sets of Solicitors, all of which might have been spared if the Council had chosen to bring forward one Bill for purchasing all the undertakings—a proceeding which, in his opinion, would have been in accordance with the view expressed by a former Parliamentary Committee (he believed

that of 1894), that if the Council purchased one they must purchase all. By the action of the Council in promoting eight Bills, not only the Water Companies but also the ratepayers would be subjected to heavy expenses, which had to be added to what he told them of six months ago—to the £250,000 which the Council had already been instrumental in wasting in trying to deal with the Water Companies. The Directors would do all they could to defend the proprietors' interests in the House of Commons in fighting these Bills. He could hardly think that Parliament would ever consent to hand over such powers to the Council after the recent exposures of the way in which that body conducted their business. At any rate, the Directors would do their best to prevent it. They would, however, offer no factious opposition when an offer was made for the purchase of the Company's undertaking, under the sanction of Parliament, and by a competent authority. If it were thought by Parliament that the undertaking ought to be acquired, they would see that the purchase was carried out on fair terms; but they would not be studying the interests of the proprietors if they met any legitimate offer that was made to them by any factious opposition. On the contrary, they must loyally accept the decision of the Legislature; only seeing they were properly remunerated for their property. The £100,000 of "B" debenture stock had been issued at an average price of £106 15s. 9d., from which they would see that their Company could not stand very badly in the market; the stock only bearing 3 per cent. interest, and being redeemable at par after 25 years. The fact was that the investing public knew the value and the security of London Water Companies' debentures, and would take any quantity offered to them. They knew that the security was undoubted; and they had no desire to see it altered or tampered with in any way. In 1893, before the Royal Commission, one portion of the Company's case was to get an auxiliary supply from wells. They sunk their well at Streatham, where they had been highly successful. They now drew every day over 2 million gallons of water from this well; and it was the opinion of their Engineer that if they had greater power there, and other accommodation, they could obtain a larger quantity. This well was sunk on the advice of eminent scientific men, who pointed out other sites where they might make borings; and following this advice—in their desire to carry out the plan they placed before the Royal Commission—they had selected two other localities in which they had made borings, to obtain further supplies of water from the chalk. One of these borings had been completed; and from what they had ascertained, they felt justified in proceeding with the work. The other boring had not yet reached the chalk; but there were indications that an abundant supply of water would be obtained from this source. Both the wells would be pushed forward; and if they were as successful with them as they had been at Streatham, it was quite possible that the three wells would be a very important factor in the quantity of water they wanted now and in the immediate future for the supply of their district. The works at Hampton were proceeding satisfactorily. They had completed one reservoir, which held 90 million gallons; and they were well on with another, which would hold 300 million gallons. Considerable progress had also been made with the engine-house, engines, boilers, and pumping-station; and when these were completed, they would be enabled to do pretty well the whole of their pumping from Hampton. They had ordered plans to be got out for the extension of their filters and filter-beds; and these would enable them to do all their filtration at Hampton. This plant must be completed at the same time as the other works—about two years hence—and then they would have such accommodation at Hampton that they believed they would be able to close their Battersea station; thus saving the expense there, or a large portion of it, while doing their work much more satisfactorily at Hampton. The shareholders probably had no idea—the general public certainly had no conception—of the extent of the property which the Company possessed, and would possess, at Hampton, where their works extended towards Sunbury along the river front for a distance of a mile. They were now expending there about £500,000; and Hampton would become the very heart of their undertaking. He supposed that the works now contemplated there would have cost them when finished between £1,500,000 and £2,000,000. If anything happened at Hampton, they might be placed in a very serious position; and he therefore considered that there ought to be the greatest possible amount of supervision there. The retiring Directors were Sir R. Wyatt, Mr. Tritton, and himself; and if they were re-appointed, they hoped to be able to conduct the affairs of the Company in such a way as to retain the esteem and regard of the proprietors which they now enjoyed. They were very glad to be able to revert to a 6 per cent. dividend on their ordinary stock and class "D" shares. With respect to the next six months, it was their bad half year, because their income was much less than in the period under review. He had, however, looked into the future; and, without prophesying, he thought that if they were not mulcted too much in unnecessary expenses, there was a very fair prospect of their being able to maintain the present dividend next half year. They carried forward no balance, however, and had to depend on their exertions and the good work they hoped to be able to do in the ensuing half year.

Mr. C. M. VIALLS seconded the motion.

Mr. W. B. JEFFRIES congratulated the Directors on their report, with which he thought he might say the proprietors were thoroughly well satisfied. He had been very glad to gather that there was a prospect of doing away with the filter-beds at Battersea, and of disposing of this property. He strongly protested against the enormous expenses to which they were put by the London County Council. The Companies, in fact, had to pay these expenses directly, and they also had to bear their share as ratepayers.

Mr. J. CARLISLE said that the profits contrasted unfavourably with those of some, if not all, of the other London Water Companies. Could the Chairman explain why this was so? Did it arise from any preventable cause—such as undue leakage, or in consequence of the Company having hitherto failed to obtain adequate payment for the water supplied to the consumers? Was the Chairman prepared to assure the meeting that the Engineer was perfectly satisfied with the condition of the works, machinery, and mains; and was the Engineer of opinion that all the mains were now proof against severe frost?

The CHAIRMAN, in reply to questions, stated that they now had £33,550 on deposit; but at the end of the last half year they owed their bankers £70,000 on temporary loans. When they received the money obtained by the issue of the debenture stock, they paid off this £70,000. During the six months, they had to pay interest on the temporary loans; but next half year they would receive interest from their bankers. The Directors could not go into the market and borrow every £10,000 or £20,000 they wanted for their works; and they therefore obtained such sums temporarily from their bankers. Then, when they had a sufficient amount of stock to place on the market, they paid these loans off, and started again with a deposit at the bank. Every five years, whenever the assessment question came on, they did their utmost to avoid paying a single penny beyond what they had to. They had about fourteen or fifteen different authorities to deal with; and they were never able to accept the assessments they were put at. Hundreds of items had to be taken into consideration; and not simply their profit, as Mr. Jeffries thought. Mr. Carlisle had stated that they were supplying water which was not paid for. He was certainly not aware that they were doing so; but if this gentleman would show them where they were not being paid, action should be taken at once which would remedy the defect. The only water he knew of which was not paid for was water unwillingly supplied by them—that was, water which in the hot season was wasted by householders laying a pipe on to their lawns, and leaving it to run night and day. They did their best to detect this waste; and then they put meters in such places, and got paid for the water. It was true that they received less for their water than the other Companies. Their area, however, was so poor that the average water-rate they received was 22s.; while in other districts the average was £2 5s., and in one case £3 7s. Parliament in its wisdom had said that the Company must supply water at the rate charged. If their district was a poor one, and they had to supply water at a less price than the other Companies, it was their misfortune, and not their fault. Mr. Carlisle was utterly mistaken in supposing that they obtained worse results than the other Companies, taking all the circumstances into consideration. Years ago statistics were compiled regarding the working expenses; and he remembered that their percentage was less than that of any other Company in London. He knew of no weak spot in their administration. They stated in their report that all necessary repairs and renewals had been effected for maintaining the works and plant in an efficient condition. They were most particular in this matter, for they could not allow even a screw to be loose in their property. In the early days of the County Council, that body delighted to tell them that they had no reserve fund for repairs; but he had met this absurd charge repeatedly. If they knew their business, a reserve fund was not wanted for such a purpose; the works being kept in such a condition that they required no repairs. This was the condition in which they endeavoured to keep their works. He had on previous occasions dealt rather fully with the subject of their mains. They were not responsible for the depth at which the mains were laid forty or fifty years ago. Their district was an old one; and years ago mains were laid at a depth at which they would not be placed now. If, however, they were going to lay their mains at a depth to meet the contingencies of such a frost as only occurred once in a hundred years, the outlay of capital would be so heavy that they would never get a dividend to repay them. When a man built a house in this country, he built it strong enough to meet the ordinary conditions of the country; he did not build it strong enough to resist the shock of an earthquake, which never occurred here. He did not think that in the past their mains had been laid sufficiently deep; but during their own administration they had put down many miles, and their rule was to lower them to a depth of 3 feet. This work would be gradually carried out; but they could not do it all in six months, and throw the expense on any one period. They were doing all they could in this matter as prudent business men.

Mr. CARLISLE thanked the Chairman for his explanation, and asked whether the Company could compel a householder to have a meter.

The CHAIRMAN: Certainly; if the water is not for domestic purposes.

The report was then unanimously adopted.

Resolutions were afterwards passed declaring the dividends recommended; re-electing the retiring Directors and Auditor; and voting (in accordance with resolutions passed in December, 1893, and December, 1895, respectively) donations of twenty guineas towards the maintenance of the Hampton Schools and five guineas towards the maintenance of the Hampton Hill Schools for the year 1897.

The proceedings then terminated.

CHELSEA WATER-WORKS COMPANY.

The Half-Yearly General Meeting of this Company was held at the Offices, Commercial Road, Pimlico, last Thursday—Sir W. H. WYATT in the chair.

The SECRETARY (Mr. G. H. Gill) having read the notice calling the meeting, the report of the Directors was taken as read. He afterwards read the report of the Company's Auditors, who stated that he accounts presented were duly supported by vouchers and were correctly deduced from the books. They had great pleasure in again expressing their entire satisfaction with the clear and precise way in which the accounts had been kept.

The GOVERNOR, in moving the adoption of the report, observed that the Directors met the proprietors on this occasion with peculiar pleasure, as they felt that the latter would regard the report and accounts as most satisfactory, as they themselves did. They were enabled to recommend a dividend a little in excess of that which they had ever paid before; and they could do so without straining matters in the least. It must not, however, be supposed that everything was *couleur de rose* with them, because there were one or two thorns in their side which they found it very difficult to get rid of. One was the constant increase in the rates by the several parishes. They were now paying £16,000 a year in rates alone, which was a very large sum out of the amount available for dividend; and they had to pay it, whether they succeeded in earning it or not. He was afraid, moreover that as time went on the rates were more likely to increase than otherwise. Another matter they had to complain of was the harassing conduct of

the London County Council, and the expenses thrown upon them by that body. Last year, the Company did not have to pay quite as much as usual, because they had a little reserve in hand for the purpose; but it would appear as if they would this year have again to pay as much as ever, for the County Council had brought in eight Bills to enable them to buy up the undertakings of the Metropolitan Water Companies. It was a monstrous thing to go on as the County Council did in this matter. Eight Bills meant eight separate defences; and each Company had to employ Counsel. This was very good for the gentlemen of the law, but not for the Company or the ratepayers. At the same time, with the exception of these two points, he thought that they were in a very satisfactory state. There had been a good deal of talk with regard to the proposed Government Bill; but they understood that this measure was withdrawn. The Government tried hard to make some settlement, but found it impossible to do so; and the Directors were assured, and believed, that there would be no Government Bill next session. He did not for a moment suppose that the County Council would carry their proposed Bills, because recent circumstances had not made them stand so very high in the estimation of the public that the latter would be anxious to put further business in their way. The income of the Company was steadily increasing; and therefore, notwithstanding the heavy "pulls" against them, they hoped they might manage to get on. They might have distributed more than the 10 per cent. per annum which it was proposed to pay on the ordinary stock, together with an extra dividend of 5s. per cent. on account of former dividends which had fallen short of the maximum statutory rate. They had, however, thought it far better not to attempt anything more than they had reasonable hope of being able to maintain. He thought they would be able to continue the present distribution; but they could not say. They were assured by their Engineer, and they believed from personal inspection, that all their works were in good order and condition.

The DEPUTY-GOVERNOR (Mr. F. S. Clayton) seconded the motion.

The GOVERNOR, in answer to Mr. J. Drew, stated that the preference stock which had been converted into ordinary stock would participate in the back dividends. Preference stock which was converted ranked absolutely as ordinary stock.

The motion was unanimously adopted; and resolutions were afterwards passed declaring the dividends recommended on the preference stocks and the ordinary stock.

The meeting was subsequently made special.

The GOVERNOR proposed—"That the debenture stock authorized to be issued by the Chelsea Water-Works Act, 1896, be, in exercise of the powers conferred on the Company by that Act, hereby created; and that the stock thus created—*i.e.*, £50,000, including premiums—be issued and disposed of by the Directors (subject to the provisions of the aforesaid Act), in such manner, in such proportions, at such times, on such terms, and subject to such conditions of sale as may by the Directors be deemed expedient from time to time."

The DEPUTY-GOVERNOR seconded the resolution, which was adopted.

Mr. DREW then proposed, and Mr. HARRISON seconded, a vote of thanks to the Governor, Deputy-Governor, and Directors; and the motion was carried unanimously.

The GOVERNOR briefly acknowledged the vote; and the proceedings then terminated.

THE PROPOSED MUNICIPAL GAS SUPPLY FOR VIENNA.

Writing last Thursday, the Vienna Correspondent of "The Times" made the following remarks on the above subject: "The Vienna gas question would appear to be solved by the decision taken last night at the Town Hall. The proposals of the Imperial Continental Gas Association were refused, and it was resolved to break off all negotiations with them. Dr. Lueger and his friends thus find themselves in a position to fulfil one of the important points of their programme as it existed long before they came into power, while they were canvassing for popular favour. Since they have held office, Dr. Lueger has repeatedly stated in public that the English company should be turned bag and baggage out of Vienna at the expiry of their contract. It is difficult to give a fair opinion on so complicated a question, without being initiated into all the particulars on both sides. Vienna, like any other town, is perfectly entitled to provide its own lighting; and the Municipality, of course, has every right to accept or refuse the offer of the company for taking over their works and material. Moreover, it is the concern of the population itself whether it is advisable to turn the streets upside down for the laying of new mains. This much said, however, it is only right to add that, from the experience of the Imperial Continental Gas Association on this occasion, it would scarcely seem advisable at present for foreigners, and for Englishmen in particular, to invest their money in this country. Business transactions are not dealt with from an exclusively business point of view. Local and political considerations have too much influence in the treatment of public enterprise; and so long as anti-Semitism is emancipated from all control, foreign undertakings in Austria are scarcely likely to prosper."

The Acetylene Gas Lighting Development Syndicate, Limited, has been registered with a capital of £1200 in £10 shares, "to acquire, develop, and turn to account any patents relating to the manufacture of chemicals used in the production of acetylene gas and carburetted hydrogen, and to acquire the benefit of an agreement with Vivian B. Lewes and the Comptoir International, Limited."

Sales of Shares.—Last Tuesday, some £20 shares in the Gravesend and Milton Water Company, paying the statutory dividend of 10 per cent., besides instalments on account of arrears, were sold by auction; the price realized being £65 per share. A number of £5 shares in the Shelley and Shepley Gas Company have lately been sold by auction at prices varying between £8 7s. 6d. and £9 each. At Camborne, Mr. W. A. Sims recently offered a number of shares for sale. Included with them were 21 shares in the Camborne Gas Company, which sold for £5 6s. and £5 6s. 6d. each; and five shares in the Hayle Gas Company, which realized £4 2s. 6d. per share.

STRIKE AT THE PLYMOUTH GAS-WORKS.

The Gas Workers' and General Labourers' Union appear again desirous of causing trouble at the Plymouth Gas-Works. After the difficulties attendant upon the introduction of the new mechanical stoking plant had been overcome, work seemed to be going on very smoothly. But the Union has a new District Secretary—his name is at least unfamiliar—and it suddenly appears that the men have quite a lot of unsuspected grievances. A month ago, Mr. Brabham, the new Secretary, wrote to Mr. A. Wharton, the Manager, and Mr. J. Thomas, the Secretary of the Company, enclosing a list of suggested alterations in the conditions of labour at the works, and expressing the hope that it would meet with the favourable consideration of the Directors. The men, said Mr. Brabham, would be glad to have an opportunity of meeting the Directors; and he concluded as follows: "A deputation has been appointed, including myself as the men's representative; and we should be glad to meet representatives of the Company at your convenience." The schedule of suggested alterations appended to the letter consisted of seven clauses. The first was that the eight-hour shift should be adopted for all men working in the carbonizing department; the second and third, that, in putting on and discharging men, consideration should be had to length of service, and that seven days' notice should be given to, and required from, the men leaving. Clause 4 reads: "That all regular workmen shall be invited to join the Union;" and clause 5: "That no man shall be victimized for being a Union man, and endeavouring to bring any cause of dissatisfaction before the officials of the Company." In clause 6, there was a return to the subject of the conditions of labour, in a request that provision should be made that coke should be hauled a reasonable distance, and three men be worked for three gangs; while clause 7 suggested the payment to men working in the purifying-house of "4d. per day extra above ordinary paid wages for all such work."

To this petition Mr. Thomas replied that, while the Directors had no desire to say anything for or against any Union, they must decline to "receive any deputation including outsiders, with the object of interfering with the control and management of their works." If the workmen had any suggestion to make respecting their conditions of labour, they were to communicate direct with the Manager. Mr. Brabham replied, expressing regret that the Directors had "taken exception to the men's method of putting their case," and maladroitly hinting that, unless the Directors came to a better frame of mind, the matter would be made a public question. In acknowledging the receipt of this communication, Mr. Thomas promised to lay it before the Board. Then Mr. Brabham wrote again. He was about to visit Plymouth, and hoped the Directors would grant him the desired interview. "I should be glad," he said, "to point out to them that our appeal is not put in any spirit of dictation, but only in conformity with what many other large and important companies have granted their men, and could in no way lower the dignity of the Directors by making a concession to their men."

Mr. Brabham's persistent efforts to obtain recognition as the agent of the Company's workpeople met with no success. Following hard upon his letter, he presented himself at the offices of the Company with a request to see the Directors, who were then holding a meeting. He was politely told, as he had been told in the letter from Mr. Thomas, that they would at any time receive a deputation of their own men, but could not acknowledge the right of Mr. Brabham to interfere between the Company and their employees. The deputation of workmen, however, did not come. Instead of it, Mr. Brabham attended the next meeting of the Directors, accompanied this time by another official of the Union—Mr. William Thorne. Both gentlemen were informed that, from the Directors' point of view, the position was unchanged, and could not be changed; and the representatives of the Union left without achieving their object of obtaining recognition of the Union's claim to interfere in matters affecting the control of the works.

Altogether, more than a month was wasted in these efforts to force the Directors from the position they had taken up. Mr. Brabham's first letter informing them that a deputation had been appointed, including himself, was dated the 5th of November. Finding at the end of a month that there was no hope of the deputation being received, the men wrote on the 10th inst. to Mr. John West, the Consulting Engineer of the Company, asking him to talk over the matter with them. Mr. West and Mr. Thomas accordingly met the men on that day, and had some conversation with them on the subject of their grievances. Both gentlemen explained that they were there without authority to deal with the questions at issue, but promised that they would lay the men's views before the Directors. The chief demand was that all the workmen in the carbonizing department should be placed on the eight-hour shift, as the stokers already were. Mr. West agreed that the coke wheelers, pipe jumpers, and scurfers had made out a case for this concession; and he said that, as far as they were concerned, he would recommend the Directors to grant it. But there was a difficulty over the coal wheelers. It was stated by the Manager, that, though the coal wheelers were nominally at work twelve hours, the actual time was not more than 5½ or 6 hours a day. Under these circumstances, Mr. West and Mr. Thomas declined to recommend that these men's hours should be reduced; and the interview ended without any definite result. However, Mr. West saw the men again on the 12th inst., and arranged that a deputation should wait upon the Directors last Thursday.

The interview duly took place, and was, to all appearances, of a very pleasant and amicable, if not wholly satisfactory, nature. As in the previous talk with Mr. West, the question turned upon the position of the coal wheelers. The men, on their side, insisted that all of them ought to be treated alike; while the Directors contended that, at all events, the point as to the actual number of hours worked by the coal wheelers ought to be definitely settled before any final answer was given. Accordingly, the suggestion was made that, as a cargo of coal was due on the following day (Friday), two of the workmen should be set apart to note, with representatives of the Company, the actual time the work took, and that, pending the receipt of this information, the matter should remain in abeyance. With this arrangement the deputation

were apparently satisfied. They left on what seemed to be very good terms with the Directors; and there was no indication of disapproval of the suggestion that the question should stand over until this further information was obtained. If the deputation were satisfied, it is certain that others were not. On Friday morning, one of the local papers published a communication from Mr. Brabham purporting to give an account of the negotiations. In this, it was stated that the representations of the deputation "were not discussed at all, but they received advice from the Directors to pay their money into a friendly benefit society rather than into a union, as the Directors had determined not to recognize any unions at all. The men were also told that the Directors had only casually met that morning, and not especially to consider their appeals, and, moreover, were given to understand that the Board did not agree to make the concessions suggested by Mr. West." The *animus* and misrepresentation underlying this presentment of the case soon bore fruit. At six o'clock on Friday evening, when the day shift of coke and coal wheelers left work, none came in to take their place; and it quickly became evident that the men were on strike. Pickets were posted at the several entrances to the works, and a crowd of many hundred people gathered in the vicinity. It was a time of much anxiety for all concerned. There were believed to be men in the neighbourhood upon whom the Company could rely in an emergency such as had arisen. But the attitude of the crowd was so menacing that none of these could be got into the place. For the moment the gas-works were in a state of siege. As a measure of precaution, the aid of the police was sought, and a force of constables was sent down to the works. At ten o'clock, the strikers were joined by the stokers whose shift came to an end at that hour; and the result was to leave the entire works in charge of only four foremen. There was sufficient gas in the holders to last the night; but no gas was being made, and the prospect before the management was that at noon the following day—one of the busiest Saturdays in the year—there would be no gas to send out. In a situation so desperate, the management had no alternative but to yield. The men required that Mr. Brabham should be granted an interview with the Directors, with a view to the concession of their demands; and it was finally arranged that they should resume work on the understanding that Mr. Thomas would call a meeting of the Directors for the following afternoon, at which Mr. Thomas and Mr. Wharton undertook, so far as they could pledge themselves, that Mr. Brabham should be received. So the strike ended, and work was resumed by midnight. It was a coincidence of the remarkable circumstances of the evening that, after the men went on strike, the coal elevators were found to be out of order and unworkable.

The Directors who were hastily summoned met on Saturday afternoon. Mr. Brabham was present, and repudiated responsibility for the strike, which he admitted to have been unwarrantable. The decision to strike was, he explained, arrived at on Thursday night after he had left the town to return to Bristol, and it would not, he said, have taken place if he had been on the spot. The singular failure of the coal elevators to work in the absence of the men, was also apologized for as the act of some unknown person with whom the Union had no sympathy. With these explanations, the way was opened for a discussion of the grievances of the men; and, as the result, an agreement was arrived at. In effect, most of the points which the men demanded were conceded, with necessary modifications. The men abandoned clause 4, under which the Company were presumably to invite their workmen to join the Union. On the other hand, the Directors took no exception to clause 5. They had never, they said, attempted to restrict the liberty of any of their men in the matter of organization; and they did not propose in future to deviate from their policy of employing workmen quite irrespective of the question whether they were or were not trade unionists. So with regard to clause 2, what the men asked has been the practice of the Company—the latest comers being the first to leave when the number of workmen is reduced; and preference being given to the older hands when men are taken on again for the season. This point was therefore conceded, with the addition of words to indicate that the rule was to operate only where the man is capable, and there is no complaint against him. The condition (clause 3) that seven days' notice shall be given to, and required of, regular workmen, was also granted; and it will be embodied in an agreement which each man will be required to sign—the experience of last week having led to the conclusion that it is at least as necessary for the interests of the Company as for those of the workmen. The remaining clauses affecting the conditions of work were also accepted. The men in the carbonizing department, who are to be placed upon the eight-hour shift, were defined to be the stokers, coal wheelers, coke wheelers, pipe jumpers, and scurfers. The coke wheelers' complaint will be met by an addition of three men, and a rearrangement of the gangs; and the men cleaning out purifiers are to receive 4d. a day above ordinary labourers' wages. Thus the business was settled; and Mr. Brabham withdrew, after thanking the Directors for the manner in which they had met the wishes of the men.

Walsall Gas Supply.—The electric light undertaking of the Walsall Town Council does not appear to affect very prejudicially the gas supply. In the past quarter, the receipts for gas sold for private consumption amounted to £6292; being an increase of £282 as compared with November, 1895. The public lighting, however, showed a falling off to the extent of £36.

Bilston Gas Company.—In the report to be presented by the Directors of this Company at the annual meeting on the 4th prox., it is stated that, after paying the usual interim dividend, there is a balance of £3817. From this amount, it is proposed to pay 5s. and 3s. 6d. per share on the "A" and "B" shares respectively—making, with the interim dividends, 10s. and 7s. respectively for the year—and leaving a balance of £1402 to be carried forward. The Directors express their pleasure at being able to report that the general improvement in trade, together with the adoption of prepayment meters for small consumers, has resulted in an increase in the sales of gas. There are now 350 prepayment meters in use; and it is anticipated that this number will be largely increased in the Company's district as their advantages become more widely known.

PRESENTATION TO MR. S. S. MELLOR.

It has been customary, in connection with the various excursions and special meetings of the Manchester District Institution of Gas Engineers, to extend invitations to representatives of different trading and manufacturing concerns which are closely allied with the gas-making industry, and who are consequently more or less interested in the proceedings of the Association. A number of the representatives of various establishments such as those above mentioned, who have had an opportunity of accepting these invitations, and have at all times experienced the greatest courtesy and helpful consideration from the Honorary Secretary of the Institution (Mr. Samuel S. Mellor, of Northwich), being anxious to give some expression to their feeling of gratitude for these services, availed themselves of the occasion of the recent presentation by the Institution to Mr. Mellor, as a recognition of his work in connection therewith [see *ante*, p. 1063], to follow this up with a presentation from many of his friends outside the Institution. This took place last Tuesday, at a social gathering held at the Grosvenor Hotel, Manchester, to which members of the Executive of the Institution were also invited. The chair was occupied by Mr. Joseph Braddock, of Oldham; the vice-chair being filled by Mr. T. Duxbury, of Darwen. The usual loyal toasts having been duly honoured, the Chairman briefly explained that the primary object of the gathering was to make a presentation to their esteemed friend Mr. Mellor, as some recognition of the kindly consideration and services they had received at his hands on the many occasions when they had been invited to attend the meetings of the Institution and its periodical excursions. Mr. F. H. Orme, of Oldham, was then called upon to make the presentation. In doing so, he remarked that Mr. Mellor had filled the post of Honorary Secretary of the Manchester Institution for a period of about seven years, during which time he had rendered very kindly services in his official capacity to many friends outside the Institution. Though they were not privileged members of the body, they wished to show in some form their appreciation of the consideration they had received from Mr. Mellor, who had always been most courteous to them. He need not say that they all wished heartily to tender him their best thanks for his kindness in the past, and also to express the hope that they might receive similar consideration in the future. They desired at the same time to give some tangible expression to these thanks; and he had been requested to ask Mr. Mellor to accept from them an illuminated album, with the signatures of his friends, together with an address, a secretaire, and purse of gold, as a slight acknowledgement of his unvarying courtesy and kindness. [The secretaire bore a suitable inscription.] He could only add that he wished Mr. Mellor very much happiness and long life; and he expressed the hope that he might remain in the position of Honorary Secretary to the Institution for a good many years. Mr. Mellor, in responding, said he could scarcely find words in which to thank his friends for their kindness in inviting him to partake of their hospitality that evening, and for the very handsome presents they had just made to him. They would always be valued by him as indicating the kindly feelings of the gentlemen outside the Manchester District Institution who had attended the meetings. Any little work that had fallen upon him in connection with making arrangements for these outside friends had been far more than repaid by the presentation they had just made to him, following, as it did, upon the very handsome testimonial he had recently received from the members of the Institution. He could only say once more that he thanked them very sincerely for their kindness. The Vice-Chairman next proposed "The Manchester District Institution of Gas Engineers." He said that, from his own experience, no Institution was calculated to do more practical good, especially to the younger members of the gas profession. He had found that, whenever any matter of difficulty had arisen, he could freely seek the advice of other members; and it was as freely accorded. He was very pleased to be present that evening to convey his personal thanks to Mr. Mellor for the many favours he had shown; and, as a Past-President of the Institution, he could also speak of the very great services which Mr. Mellor had rendered to it as Honorary Secretary. He was sure all present wished that the Institution might long continue in its very useful work. He had great pleasure in coupling with the toast the name of Mr. Isaac Carr. The toast having been very cordially honoured, Mr. Carr, in responding, expressed his thanks for the very hearty way in which the toast had been received. He said he trusted the Institution would be found, in the future, deserving of all the good things Mr. Duxbury had said respecting it. It afforded him great pleasure to be there on the occasion of their presentation to Mr. Mellor, because he knew how earnestly that gentleman had laboured in the interests of the Institution. He thought it was quite a right and proper thing that those outside the Institution, but more or less identified with its interests, should show their appreciation of the services rendered by the Honorary Secretary. He could not sit down without adding his testimony that the members of the Institution, as they had previously endeavoured to show, considered him a very able and valuable official; and he hoped Mr. Mellor might long live to enjoy the presentation that had been made to him. Other toasts followed; and the proceedings then closed.

CHRISTMAS TIME AT THE YORK GAS-WORKS.

Last Saturday afternoon, Mr. Charles Sellers, the Engineer and Secretary of the York United Gas Company, delivered his customary Christmastide address to the workmen. In the course thereof he said:—

Once more, "A Merry Christmas and a Happy New Year," to you all. This is the old, old wish; and I am sometimes afraid, as years roll on, its repetition may be apt to breed the familiarity which is akin to indifference. Nevertheless, it is a wish which, if we lived up to its meaning, would carry a Happy New Year to every household. For the wish embodies the spirit of the golden rule: "Whatsoever ye

would that men should do unto you, do ye even so to them." And if, following this rule, you cannot be entirely happy, follow the Irishman's rule and "be aisy, and if you cannot be aisy, be as aisy as you can." Perhaps you may think that this a droll rule; but it is true philosophy, for in the very nature of our being, with its sunshine and storm, our lives must ever be chequered. But it is a wise thing to repeat good wishes; for as evil wishes induce evil acts, and, like chickens, have a habit of coming home to roost, so the repetition of good wishes tends to bring about their own fulfilment.

A shrewd writer, describing the evil wisher, says—

"He digged a pit, he digged it deep,
He digged it for his brother;
And for his sin he tumbled in
The pit he digged for t'other."

It is quite true that there are a few individuals in this city who have been busy a long time trying to dig a pit, and to dig it deep, for our gas industry, so that the electric light may have the more room to shine. But if they should succeed in digging their pit, it will not be our gas that will tumble in, it will be "t'other." Digging pits at best is a risky occupation, and it is not in harmony with a Merry Christmas and a Happy New Year. It is an occupation which is an offence to natural law; for Nature neither forgets nor forgives, and the cleverest digger who ever broke her laws cannot escape her punishments.

But though Nature is exacting, she gives to the virtuous man the power to see and enjoy the good and the beautiful; while to the opposite man she hides her beauties and her "sermons in stones," and leaves him to flounder in a world which he sees only as a "vale of tears," full of thorns and thistles, and he can never find a Happy New Year in it. In fact, it is said of such a man that he is never so happy as when he is miserable. This, of course, is a delusion; the world is full of delusions. It is a delusion to believe, as thousands believe, in luck; and there is no delusion more mischievous. It leads to gambling, where the scientific spiders always catch the unscientific flies, and especially the green flies and the daft ones who believe in luck. "Luck," said the late Mr. Cobden, "is ever waiting for something to turn up; but honest labour is the only thing that will always turn up something." It is a delusion to believe that you can have a Merry Christmas and a Happy New Year by living above your income and getting into debt. "Neither a borrower nor a lender be; for loan oft loses both itself and friend." Taking care of pence may seem tedious. But appetite grows by what it feeds upon; and when you get to pounds, they take care of themselves. The alternative, of course, is living from hand to mouth, with the chance that some day the mouth will have to go short. And the man who lives upon this principle should hesitate much before he asks some bonnie Annie Laurie or blue-eyed Nellie to share such a risk, and also to share the certainty, when poverty comes in at the door, of seeing love fly out at the window. It is looking after trifles and the saving of pence upon which fortunes are built and merchant princes are made; as it is thrift which makes a Merry Christmas and a Happy New Year.

It is a delusion to believe that a working man cannot be a gentleman. "Money may make the mare to go;" but it is conduct and not money which makes the gentleman. And let me here say I am proud to feel that I am at least now standing before some gentlemen. It is a delusion to associate a Happy New Year with intemperance. "Come and have a drink" may sound like good fellowship; but it is often very senseless. It is a delusion, when we do not get on in the world, to blame Fortune, as it is proverbial for a bad workman to blame his tools. The present age is one of extravagance which induces a love of pleasure; and without condemning rational amusements, the tendency is to run to excess. Excellence in workmanship is in danger of losing its stimulus, for whoever now caters for amusements and "beats the record" is more certain of fame than the discoverer of a new planet. And yet we are told on public platforms that we are all hungering and thirsting after knowledge. This is pretty, but it is a delusion.

"Tickle the public and make it grin;
The more you tickle, the more you'll win.
But teach the public, you'll never grow rich,
But live like a beggar and die in the ditch."

Upon our business little need be said. Gas holds its own and asks no favours. It only asks for fair play and freedom from falsehoods; and with Science at its elbow constantly evolving improvements in lighting and heating, it can, with its many strings to its bow, calmly look forward to a continuance of prosperity and many, many Happy New Years.

Lastly, till we meet again upon another Merry Christmas, let the music of "Home, sweet Home" be yours; and till then may you all so act in your family circles that the joys and comforts of your own fireside will realize for you the further music of the old song:—

"'Mid pleasures and palaces though we may roam,
Be it ever so humble, there's no place like home."

Mr. Sellers then distributed the usual Christmas gifts of books, toys, and articles of dress to all the men who had children; and, in his Mother's memory, he gave twelve Christmas cakes to twelve men with the largest families—his Mother's custom in her lifetime.

A hearty vote of thanks was accorded to the Directors of the Company, and cheers were given to Mr. Sellers for his address.

New Water-Works for Chippenham.—The Chippenham Town Council have decided to adopt the scheme of Mr. E. Pritchard, M.Inst.C.E., of Birmingham, for their new water-works, and to proceed at once with a part of the scheme by having a covered circular service reservoir erected. It is to be 75 feet in diameter, with a total depth of water of 10 ft. 10 in., and with a minimum capacity of about 300,000 gallons.

Concessions to Gas Workers at Burslem.—As the result of a conference between the Gas Committee of the Burslem Corporation and a deputation from the men, the coke hands are to receive an advance of 6d. per day, time-and-a-half is to be paid for Sunday work, and firemen are to be engaged. It has also been agreed that the leading or foreman stoker shall be appointed from the ranks of the men, instead of from outside as heretofore.

ELECTRIC LIGHTING NOTES.

Is an electric lighting undertaking in the hands of a corporation likely to suffer or to profit by being left to the management of the Gas Committee? This was the question which engaged the attention of the Carlisle City Council at their meeting on the 8th inst. On that occasion, the minutes presented by the Gas Committee contained the following recommendation: "That, as a considerable portion of the period prescribed by the Electric Lighting Order, 1895, for the laying of distributing mains in certain streets has elapsed, the Council be recommended to authorize this Committee to call in a Consulting Electrical Engineer to advise as to the best means of carrying into effect the powers conferred by that Order." Mr. Corbett moved the confirmation of the recommendation. Mr. Coulthard, in seconding the motion, remarked that it did not follow that, because the proposition had come from the Gas Committee, that Committee should carry out the matter. Probably a majority of them would think it prudent that another Committee should be asked to take it in hand. It would be well to steer clear of any rivalry which might arise as between gas and the electric light; and the latter light should be made to stand on its own bottom, and not be allowed to depend on the gas to help it out of difficulties. Mr. Tweedy pointed out that the Gas Committee had hitherto done all the business in regard to the electric light; and he could not at all understand why it should be taken out of their hands now. No other Committee could do the work any better. Mr. White thought the chief reason why this matter was handed over to the Gas Committee was that Mr. Hepworth had everything to do with the previous Order that was applied for, and they had every confidence in placing it in the hands of the Committee and Mr. Hepworth again. But he thought with Mr. Coulthard that the Gas Committee was not the proper one to carry out the electric light installation in Carlisle. He agreed with Mr. Tweedy that perhaps no body could do the work better than the Gas Committee. But whatever Committee took it up should, like Cæsar's wife, be above suspicion; and there would be suspicion in the minds of the ratepayers of Carlisle—especially among those who wanted the electric light—if the supplying of it were in the hands of a Committee who had to supply a rival light. There would be suspicion that the electric light would not have fair play. He suggested that they should place the matter in the hands of the General Purposes Committee, which included the leading members of the Gas Committee. The General Purposes Committee would be able to arrange with the City Surveyor, so that improper interference with the streets might be avoided. He therefore proposed, as an amendment, that the matter be referred to the General Purposes Committee. Mr. Buck thought that, seeing there were so many members of the Gas Committee on the General Purposes Committee, they would be no better off by referring the matter to them. If a Committee were to be formed for the purpose, let them consult the Electrical Engineer, and let them carry it out too. They should either do this or place it in the hands of the Gas Committee altogether. Mr. French thought the question should be referred to a Committee which did not include any members of the Gas Committee. The amendment was carried.

Some consternation prevailed in Cardiff early in the evening of the 12th inst. by a temporary failure of the electric light. A good deal of inconvenience was caused in some of the shops in the town that trust to a supply from the Cardiff Corporation; and in several cases oil-lamps had to be brought into requisition. An inquest that was being held in the police court had for a time to be conducted by the light of wax candles. The failure of the light, however, was only temporary. The chief officer of the electric lighting works (Mr. N. Appleby) has since explained that the accident was caused by the burning of the switch-board, caused by the over-heating of the current.

Water, wind, steam, and gas have, in turn, been proposed and adopted for providing the motive power for generating electricity. A new source is now suggested; and it is no other than an improved form of treadmill, the operation of which by those condemned to "do time" with hard labour would enable the prisons to be illuminated by the electric light.

In connection with the proposed transfer of the Lambeth Electric Lighting Order by the Vestry, mentioned last week, it is noteworthy that the Board of Trade adopted what has the appearance of a new regulation in respect to such matters; the Board writing that they would not sanction the transfer to a private individual, but would require a company to undertake the responsibilities of the Order. It was in consequence of this intimation that the Vestry agreed to transfer the Order to the South London Electric Supply Corporation, Limited, which has been registered with a capital of £325,000, but will, we understand, not go to the public for subscriptions, as £200,000 will be underwritten.

Strangers were ordered to withdraw from the public gallery when the Hampstead Vestry last Thursday listened to the Vestry Clerk's explanation as to why the Electric Lighting Committee had decided to recommend "that the insurance of the alternator which was installed at a cost of £2325 be removed, from Christmas next, from the Norwich Union Fire Office, and be placed with the Fine Art and General Insurance Company, Limited, at the rate of 5s. per cent. (thereby effecting a considerable saving, the present rate being 10s. 6d. per cent.)." Under the circumstances, therefore, it would not be courteous—more especially as reporters were requested not to give publicity to the debate—to enter into the Clerk's explanation. The great point to be emphasized is that there is at least one fire insurance company that does not look askance at electric lighting apparatus as a fire risk. Apart from this interesting incident, the meeting in question will be ever memorable in the annals of Hampstead for the object-lesson furnished to the wondering ratepayers who were startled by the sudden dimness of the electric light, and by the fact that all through the building the gas-lamps were being hastily lighted. Fainter and fainter grew the fickle illuminant, until at last the Chairman of the meeting ordered a special messenger to be sent to the central station to find out what was the matter. It is really of little moment to consider what was the cause, and how it was occasioned; but the broad fact remains that the Hampstead Vestry's electric lighting installation cannot be

induced to give a respectable light even while its progenitors are sitting in solemn conclave.

The powers of which the Chester Corporation became possessed nearly seven years ago in regard to the supply of electricity are at length being exercised. The city fathers were slow to move in the matter; and they spent much time in gravely deliberating upon the course they should take. Supported by Professor Kennedy's advice, they concluded a contract, in April last, with Messrs. Thomas Parker and Co., Limited, of Wolverhampton, for the construction of the works, which have been so far completed as to permit of the formal inauguration of the light last Thursday. A representative company of councillors and citizens met in the engine-room at the electric light station, and were congratulated by the Mayor (Mr. B. C. Roberts) on the completion of the installation. He acknowledged the ready support the citizens had given the Corporation in the matter, and said that at the moment they had more applications than could be dealt with. More machinery would be required; but he hoped that what they had at present would see them well through the winter. He looked forward to the electric light yielding a handsome supplement to the borough rate, and also disavowed any hostility between the Corporation and the Gas Company, for if the former had not taken the work in hand, some private company would undoubtedly have done so. The Mayoress afterwards unlocked a gold bracelet (presented to her by the Contractors) and switched on the current. The event was celebrated later in the day by a banquet at the Town Hall; and in the evening the main thoroughfares were lighted by the new system. The total outlay on the installation will be £22,000, independent of the cost of lighting the Town Hall and market, which will involve an additional expenditure of about £1800.

Suppliers of electricity in this country have an advantage over those who purvey the article when "made in Germany," in this respect at all events—that they can punish anyone who steals their product. It is clearly laid down in the Electric Lighting Act, 1882 (section 23), that "any person who maliciously or fraudulently abstracts, causes to be wasted or diverted, consumes or uses any electricity, shall be guilty of simple larceny and punishable accordingly." From what has lately appeared in the papers, however, anybody who can surreptitiously tap an electric cable in Germany does so with impunity from fine or imprisonment, though he may get a shock. A trader a short time since fraudulently obtained a supply of electricity for lighting and motive power purposes; and on this being discovered, he was charged with theft. It was held by the Courts, however, that electricity, not being a material object, could not be stolen; and on this ground the accused was discharged. Of course, steps will be taken to alter the law, so as to make it punish rather than encourage the evil-doer.

METROPOLIS WATER SUPPLY.

The Controversy on the Analytical Examination of London Water.

In the "JOURNAL" for the 10th ult. (p. 923), we gave the principal portions of a letter addressed to "The Times" by Dr. Percy Frankland, F.R.S., in defence of the existing system of examining the water supplied to the Metropolis, which had been impugned by the Chemist to the London County Council (Mr. W. J. Dibdin, F.I.C., F.C.S.), and Drs. Dupré, Klein, and Stevenson, who had reported to that body on the subject. We also gave an extract from an article in the "British Review" criticizing Mr. Dibdin's conclusions. The attention of the Water Committee of the Council having been called to these criticisms, they were referred to Mr. Dibdin, who has reported at some length upon them.

Dealing with the observations of the "British Review," Mr. Dibdin points out that they were first of all directed to the estimation of the quantity of suspended matter; and it was attempted to throw discredit upon the results in consequence of the small quantity found. He says the average excess reported as unavoidable was 0·0022 grain per gallon; and it was argued that such quantities were negligible. It was fortunately true that the amount of suspended matter per gallon was small; and if it consisted entirely of mineral matter or peat, it might well be overlooked. The importance, however, rested in its character, and not in the quantity. What he proved, both by chemical and microscopical examination, was that the suspended matters in the water as supplied to the consumer were substantially of the same character as those occurring in the unfiltered water; and he asserts that this contention has so far not been disputed. The fact that the suspended solids before and after filtration were similar in character, differing only in amount, showed conclusively that the filtration was not at all times perfect; and when this was imperfect, there must exist a danger to the health of the consumers. It was contended that the monthly statements of Dr. Frankland and others were more reliable than his own, as they were based upon duplicate examinations. He says that in this it has been overlooked that his results were based upon daily tests, and therefore upon the average of some 26 or 27 analyses per month instead of upon one or two. He submits that this is a far more satisfactory method than that adopted by Dr. Frankland and Messrs. Crookes and Dewar.

Passing on to consider the method in which the samples were taken, Mr. Dibdin continues: "It is next charged against me that my samples were not taken in a sufficiently careful manner; that probably they were taken by unskilled persons; and that Dr. Klein's samples were taken in Winchester quart bottles instead of in sterilized tubes. The reply to these statements is that all samples were taken in bottles which had been carefully cleansed with strong sulphuric acid to destroy all organic matter which might have been left in them from the previous collection, and that those samples intended for bacteriological examination were taken in small bottles, which had been first cleansed in the same way as the Winchester quarts, and then heated in a sterilizing chamber to a temperature of 400° Fahr., after which they were packed in sterilized cotton wool, and remained so until they were unpacked at the spot where the samples were taken. The stoppers were removed in the stream of water as it issued from the main; the unopened bottles being first well rinsed as a precaution. After being filled in the stream issuing from the hydrants (care being taken to avoid the water coming in contact with the collector's hands during the whole operation), the stoppers were re-inserted with the sterilized forceps; and the bottles, in the majority of cases, packed in ice, and at once carried to the respective laboratories. At first the samples for Dr. Klein were taken in such small bottles; but, at his request, the cleansed Winchester quarts were employed for him. In the case of the samples for Drs. Dupré and Stevenson, these were sent to them both in small sterilized bottles and in Winchester quarts. In order to avoid accidental contamination from dirt which might have obtained entrance into the orifice of the stand-pipe, this was carefully brushed out, and a large quantity of water allowed to flow therefrom before the samples were collected. Most of the samples were taken by assistants who had received special training in bacteriological and chemical laboratories, and would therefore be well qualified for this duty." With regard to the criticism that "the proof of the water, after all, is in the drinking; and so long as London shows such a satisfactory rate of mortality and freedom from epidemics traceable to water supplies, mere statistics of plate cultures may be received with equanimity," Mr. Dibdin reminds the Committee that in his report he drew attention not only to plate cultures, but to the presence of suspended matters; pointing out that they were "avoidable," and that, in the case of one Company drawing their supply from the Thames, these objectionable matters had been prevented from passing to the consumer, and that therefore there was no reason why the remaining Companies should not also prevent their passage through the filters and conduits. He also showed that those matters would be even more effectually kept out if the Companies would soften the water before supplying it to the consumer.

In the course of his remarks on Dr. Percy Frankland's letter, Mr. Dibdin says: "There do not appear, in reference to this letter, to be any observations calling for remark so far as my report is concerned, as I note that Dr. P. Frankland states that my results are in accordance with his own; his contention being that the results of Dr. Klein as to the number of bacteria are largely in excess of Dr. P. Frankland's and my own. . . . In a leading article in 'The Times' of Nov. 10, it is contended that my conclusion as to quality of the filtered water varying with that of the river water at the intakes is not maintained by the results of the quantitative examination of the suspended matter, as while at the commencement of my investigations I found 0·038 grain per gallon in the Southwark Company's water, 0·014 grain in the Chelsea Company's, and the West Middlesex, the New River, and Kent Companies' supplies contained from 0·001 to 0·002 grain per gallon, these fell at the end of the inquiry, when the river water was at its worst, to a maximum of 0·006 grain per gallon; the average being 0·003. This argument arises merely upon a misreading of my report. After referring to the improvement which has taken place in the quality of the water between the years 1892 and 1895, I point out the still further improvement which took place during the latter year, notwithstanding the fact that as the bacteria increased in the river they correspondingly increased in the unfiltered supplies, but not to the same extent as in the previous winter season, and nothing like to the same extent as during the investigation carried out in 1891-2. It is true that the suspended matters, as I pointed out, did not rise with the increased impurity in the river water at the end of the inquiry, though the impurities in solution did, but, like the bacteria, not to the same extent as in 1891-2."

In their report to the Official Water Examiner for the Metropolis (Major-Gen. A. de Courcy Scott, R.E.) on the quality of the water supplied to London during November, Messrs. Crookes and Dewar bear testimony to the excellence of the Companies' filtering and storage appliances, and then make the following remarks on the subject of the recent controversy on the methods adopted in the analysis of the water: "Having had our procedure attacked, we may as well put on record that since commencing the bacterial examination of the London waters in 1886, we have always used incubators properly controlled by sensitive gas-regulators; and in no instance has the internal temperature varied beyond the proper limits—namely, in the case of gelatine cultures, between 20° and 20·5° C. To our surprise, however, in Dr. Klein's recent report to the London County Council, he expresses himself in the following words: 'I have seen it stated, in the publications of the London Water Companies' Analysts, that during November these gentlemen counted the colonies, after 48 hours, in the plates exposed to the ordinary temperature of the laboratory, and found their numbers varying between 7 and 70. I have no hesitation in saying that no bacteriologist would accept these figures as representing the actual number of bacteria present in the water. Only a fraction of the colonies develop in a gelatine plate after 48 hours if the plate is kept at temperatures below 17° or 18° C.' Farther on, Dr. Klein says: 'The small number of microbes stated to be present in the London waters by the Companies' Analysts are only to be explained by the imperfect methods used, keeping the plates at the temperature of the laboratory, and counting the colonies already after 48 hours, when they have barely commenced to grow.'" Messrs. Crookes and Dewar assert that the remarks here quoted—and especially that as to keeping the plates exposed to the ordinary temperature of the laboratory—have no foundation in fact; no such statement as the one particularly alluded to having ever appeared in their reports.

SHEFFIELD CORPORATION WATER SUPPLY.

The Reorganization of the Staff.

The Water Committee of the Sheffield Corporation last Wednesday further considered the question of the reorganization of their staff, and passed three important resolutions. The first accepts the resignation of the Engineer (Mr. E. M. Eaton) as from the 31st inst.; and, from that date, the new arrangement with him, as recommended by the Special Committee's report, which was adopted by the Council on the 9th ult., will come into force. This means that, from Jan. 1, Mr. Eaton will become Consulting Engineer for the Little Don water scheme, at a

salary of £500 per annum, until the Langsett reservoir is completed, and Consulting Engineer to the existing water-works, at a salary of £250 per annum for the next two years. Having regard to the altered position of the management of the water department, and the increased duties and responsibilities which will devolve upon Mr. W. Terrey (whose three years' engagement terminated last February), the Committee recommend, in the second resolution, that he be appointed to the position of General Manager of the water undertaking; that he be responsible for the entire management and control of the department, except so far as relates strictly to engineering work, but including the financial management of the Little Don water scheme; and that his salary be at the rate of £800 per annum from Jan. 1 next. The third resolution recommends that Mr. Leonard S. Marsh, at present Resident Engineer, be appointed Engineer to the works of the department from Jan. 1, and that his salary be at the rate of £600 per annum.

BELFAST AND DISTRICT WATER COMMISSIONERS.

Annual Accounts.

The financial year of the Belfast and District Water Commissioners having expired, the customary financial statement was laid before the members by Mr. E. W. Pim at their last meeting. He stated that the rates had amounted to £29,093, which was an increase of £1176 on 1895. Special supplies had produced £26,871, which was an advance of £2004. Out of this, the quantity of water sold by meter was in 1896 767 million gallons, yielding £21,034, as against 709 millions in 1895, bringing in £19,505. Compared with 1890, when the prices were arranged to meet small consumers, an increase of 50 per cent. was shown; the figures being 449 millions, and the receipts £13,092. With regard to expenditure, the dividends on stock were: In 1895, £20,300; in 1896, £23,228. Sinking fund: In 1895, £6600; in 1896, £7100. Wages: In 1895, £2692; in 1896, £2810. Salaries: In 1895, £1882; in 1896, £2225 (due to an increase in the engineering staff). Collectors: In 1895, £1641; in 1896, £1659. Maintenance on the home works: In 1895, £1221; in 1896, £1231. Woodburn: In 1895, £1796; in 1896, £1755 (£1000 of this is for repair of conduit, and really chargeable to capital in both years). Stoneyford: In 1895, £673; in 1896, £806. Repairs to meters: In 1895, £441; in 1896, £423. Stamping fittings: In 1895, £212; in 1896, £211. Waste inspection: In 1895, £933; in 1896, £656; but in the former year £171 was laid out on meters. The saving effected had been more than a million gallons per day. To bring in this quantity, a capital outlay of £60,000 was required; and this would cost for interest alone about £2400 per annum. Thus, besides preventing the water running to waste, for an outlay of £656 they had saved a useless loss of £2400 per annum. The only other items were: Rent and taxes in 1895, £2569; in 1896, £4029. General expenses: In 1895, £634; in 1896, £1256. The statement was considered most satisfactory, and the working proceeding very prosperously.

THE TYNEMOUTH CORPORATION AND THE NORTH SHIELDS WATER-WORKS.

A Special Meeting of the Tynemouth Town Council was held on Monday last week—the Mayor (Mr. T. T. Bolton) presiding—to sanction the Bill now being promoted by the Corporation to empower them to supply water to the borough of Tynemouth and adjacent places, and to acquire the undertaking of the North Shields Water Company. Alderman Elliot proposed a resolution to the effect that the Bill be adopted. They had, he said, held two or three Sub-Committee meetings, and a full Committee meeting, and the Bill was the product thereof. Its main purpose was to purchase the Water Company's undertaking, with its responsibilities; to obtain money to pay for it; and to assess rates upon those who bought the water, in order to meet the various charges that would come against the Corporation annually. Alderman Spence, in seconding the motion, said he thought the Corporation were taking the right step. Mr. A. Whitehorn supported the motion, and said he was very pleased, in going through the Bill, to observe that there was a clause giving other authorities the power to take a portion of the undertaking into their own hands, on payment of a proportion of the money to be paid to the Water Company. He could, therefore, see no object in opposing the Bill. The matter had not been formally before the two adjoining authorities; but he thought that, instead of there being any opposition from them, they would give the Corporation all the assistance they could in getting the Bill passed. Mr. J. H. Burn said he did not see what advantage the Corporation would gain by buying out the Company, unless there was some other scheme behind it. What provision were they going to make for supplying the borough with water, if they bought up the undertaking? Alderman Armstrong, in supporting the motion, said their chief complaint had been that the Company would not avail themselves of the supply at their disposal; and that they had persistently refused to construct a reservoir to store water within the borough—an action that was well within their power. At the last Council meeting, the table giving the quantity of water in store showed that for the past three or four months it had been gradually diminishing, and that there was only 20 days' supply of water. They proposed, to meet any difficulty, as soon as they got hold of the undertaking to make, at their own cost, another reservoir within the limits of the borough, and to purchase water from the Newcastle Company when they were, as at present, running it to waste, if they were willing to sell it, and so provide for anything that might happen to the pipes, either by frost or other causes. In short, they proposed—and there should be no difficulty in carrying it out—to establish a supply for at least 60 days within the limits of the borough; and this would make them as safe as they could hope to be. If this would not do, then they would have to face the tremendous problem of going somewhere else for water. The motion was then put, and carried with one dissentient. The Town Clerk having read the petition in favour of the Bill being laid before the House of Commons, it was ordered to be sealed.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Though the haulage of tramcars is one which does not directly interest readers of the "JOURNAL," they have a strong indirect interest in the subject, because of the likelihood of gas motors being employed. The probability has never been what may be termed a particularly near one; but if there be anything substantial in the proceedings that have taken place in Glasgow this week, it is further off than ever. The Corporation of Glasgow own the tramway undertaking in the city, and work it themselves. At present, the system is a horse-haulage one; but this displeases a number of the councillors, and for nearly a year a strong effort has been made to introduce mechanical traction. The system which has been most in favour has been that of electrical propulsion, by means of overhead trolley wires. The Council were all but committed to this method. But the community did not view it in the same light as the Tramways Committee, who were dead-on for it; and so, to make certain of their footing, the Town Council sent the Tramway Manager to America, so as to investigate the subject. This gentleman returned about two months ago; and recently he submitted his report. The document was again in favour of the trolley wire. The Tramways Committee were to have met on Wednesday to consider the report; but a most extraordinary thing happened. On Tuesday, a firm of Law Agents sent in an offer, on behalf of clients, the effect of which was that the Committee at once postponed consideration of the Tramway Manager's report, and resolved to give all reasonable facilities to the offerers. The clients referred to are Sir William Arrol and Mr. G. Johnston, of Springburn, Glasgow. These gentlemen are inventors of a new motor—an oil one—which they offer to the Corporation for use on the tramway lines. The offer is, first, to give a month's free trial on any section of the lines which might be selected. If the Corporation should then decide to adopt the motors, the offerers are prepared to provide, run, and light the cars, for the whole city or such sections as may be decided upon, during a period of seven years; defraying all the cost of, and taking all responsibility connected with, the haulage of the cars; while the control of the Corporation over the drivers, conductors, time tables, fares, and so forth, would remain as before. Moreover, at the end of the seven years the whole of the cars, motors, and plant would be handed over to the Corporation in thoroughly efficient working order, free of any charges for capital or payment for royalty. The price to be paid by the Corporation for the seven years' service would be, to put it briefly, the equivalent of the cost of horse haulage; while they would have the option of taking over the whole concern at the end of one year—paying the offerers for the remaining six years on an equitable basis. If the Corporation are only to pay the present cost of horse haulage, they would be getting this new mechanical system introduced practically without any extra expense at all; while at the end of the seven years they would have all the cars and plant handed over to them for nothing. The nature of the motors is not explained, for obvious reasons connected with the patents. But it is stated that they are of an entirely new form, the result of long and exhaustive experiment; neither fire nor water is used in connection with them; and they run absolutely without steam, smoke, or offensive smell. Such an offer could not be refused; and so a trial will be given to the new motor. It almost looks as if the offer were too good to be true; but then, when a man of the stamp of Sir William Arrol is found backing up a new invention with, it is stated, a sum of £40,000, it must be concluded that there is something in it. The development will be eagerly looked for by a wide circle of people who are interested in mechanical motors for all purposes.

Last August, the Corporation of Glasgow reduced the price of gas from 2s. 4d. to 2s. 2d. per 1000 cubic feet. The result is seen in the reduced sum collected for gas; the amount being £5685 below that which was collected in the corresponding period of last year. The returns from residual products for the period down to the end of October also show a falling off. Last year, the sum received was £40,912; and this year it is £37,991—a reduction of £2921. At the meeting of the Corporation on Thursday, it was reported that Messrs. D. Ireland and Son were prepared to arrange an amicable settlement of the action at present in the Court of Session, regarding the price of 900 tons of coke which they purchased from the Corporation in 1892. The Council remitted the matter to Councillor D. M. Stevenson and the Law Agent, to come to terms with the firm in the matter.

The Rothesay Corporation Gas-Works having been now transferred to the new site, the Town Council, presided over by the Marquis of Bute, as Provost of the Burgh, on Monday decided to make over the old site as at the 15th of May next to the Burgh Lands Committee, at the price of £900. The salary of Mr. J. Ballantyne, the Gas Manager, was advanced by £10 a year, with £20 for extra work. The Council also reduced the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet. Mr. Ballantyne reported that at the new works 18 retorts were making as much gas as 32 retorts did in the old ones. This is instructive, and should be a lesson to everyone not to starve gas-works plant in any way. It is liberal treatment which brings in the return.

Matters are going on in the Perth Corporation Gas-Works in a manner which leaves nothing to be desired. At a meeting of the Gas Commission on Monday, it was reported by Mr. A. Wilson, the Manager, that the quantity of gas made during November exceeded the make in the same month of last year by 952,000 cubic feet; and that the gas delivered in the town showed an increase of 7·55 per cent. Over the period of the year which has elapsed, the increase has been 11·42 per cent. The average yield of gas per ton of coal has been 10,652 cubic feet. Last year, in the same period, it was 9759 cubic feet per ton of coal; so that this year the same quantity of coal would have yielded 3,785,100 cubic feet of gas more—or, put in another way, there has been a saving of 413 tons of coal. The Gas Commission agreed to erect a governor-house at the storage station at the shore, at a cost of about £600. The Commissioners had before them the subject of the quantity of gas consumed in the Railway Station and the Station Hotel. The owners of these places had complained of the increased quantity of gas charged for, and had indicated that the high pressure at which the gas had been supplied accounted for it. The Gas Manager, however, disposed of the alleged cause—which, by the way, is a common complaint, and

which it is pleasant to see settled for once—by pointing out that in the early part of the year, when the pressure of the gas was greater than it is now, there was no increase in the quantity of gas consumed. He stated that more lighting was being used in the station; and that, as regarded the hotel, two additional gas-cookers had been used this year. He further attributed the greater quantity of gas consumed to defects in the fittings; and, as the result of tests made at his instance, he said he had discovered escapes of gas to the amount of 150 cubic feet per hour. The Works Committee, before whom these statements were laid, came to the conclusion that the pressure did not account for the increased quantity of gas used; but, in the special circumstances, they agreed to give a deduction of £20 from the account. When the subject came before the Commission on Monday, it was agreed to adopt the finding of the Committee.

I am afraid the proposed gas transfer at Stirling is not to be carried through so easily as a short time ago appeared likely. A meeting of the Police Commission was held this week, at which a letter was read intimating that a meeting of ratepayers had demanded a *plébiscite* on the Gas Question. It was thereafter moved by a member of the Corporation that a *plébiscite* be taken; but the Town Clerk intervened, and ruled that the Commission having agreed at their last meeting to make an offer to the Company, it was incompetent to go back upon this without first setting that resolution aside, of which notice would require to be given. This ruling was dissented from by two members of the Corporation; one of whom said that a *plébiscite* would be taken all the same. This means that a private and irresponsible vote of the ratepayers will be taken, in which few will move except the objectors; and there will thus be a majority against the transfer. The dissentients are too abrupt; they should have waited to see the attitude of the Gas Company. By doing as they are, they are likely to prejudice the minds of a number of the ratepayers; while if they had waited till the Company had given their reply, it might have been possible to have made explanations which would have satisfied everybody. Perhaps, however, that is not what the objectors desire. They are a small body; but circumstances have favoured them at this time, because, though the Police Commission could not have acted otherwise than they have done, their refusal of the demand for a *plébiscite* may be misunderstood, and thus the question will be complicated.

The Dunfermline Police Commissioners sat on Monday to consider their new powers and duties as owners of the gas undertaking. They met in private, and disposed of a number of accounts, the substance of which I gave last week. The total costs of the arbitration, it has been ascertained, will be less than £5000; but this sum does not include the conveyance of the property from the Company to the Corporation. This, however, is not an expense caused by the arbitration, as it would have had to be borne in any event. The Commissioners appointed a Sub-Committee to consider the subject of the borrowing of money wherewith to pay the Company the amount of the award.

At the Kilsyth Gas Commissioners' meeting on Monday, it was agreed to proceed with the erection of a new gasholder, of 45,000 cubic feet capacity, at a cost of about £1500; and instructions were given to the Clerk to negotiate for the purchase of a piece of land adjacent to the works, for a site.

The Arbroath Gas Corporation have been struggling this week over the proposed Harbour Bill for the town, in which a provision is to be made that the Gas Corporation should be required to pay £1000 towards the liquidation of a loan over the harbour and £250 per annum for a number of years. When they met on Monday night, the Clerk to the Corporation pointed out that the Corporation had never had the Bill before them; and that they were now being asked to sign a petition in favour of it. In the Clerk's opinion, the want of consideration on the part of the Gas Corporation would probably lead to the Bill being thrown out. After a long discussion, it was agreed to meet again next day, to consider the Bill. At the second meeting, the Clerk first proposed that the Bill should be opposed; but this was overruled. He then proposed that the provision with reference to the £1000 should be struck out; but this, again, was overruled. He next proposed that under the existing arrangement, whereby half of the profits on the gas undertaking for the year are paid to the town, this amount should be applied towards the payment of the £250 a year. This was agreed to; and it was remitted to the Parliamentary Solicitors to add a clause to the Bill, to carry the arrangement into effect. As the profits for the year in Arbroath are usually about £4, it is difficult to see how the Gas Corporation could be made to pay £250 out of half of that. I think the Clerk has gained a victory.

At the meeting of the Ayr Town Council on Monday, the subject of the increased consumption of gas in the public lamps was considered. It was pointed out by Treasurer Meible that, notwithstanding the introduction of the electric light, the consumption of gas had gone up in a most unaccountable manner. He found that last year on the south side of the river 585 lamps consumed 840,000 cubic feet of gas; whereas this year 440 lamps were represented as having consumed 1,330,700 cubic feet. On the north side of the river, last year 328 lamps consumed 495,131 cubic feet of gas; while this year 290 lamps had consumed 545,900 cubic feet. The remark was not followed up by any motion; but apparently the Corporation did not see anything to be alarmed at in the figures, for they proceeded to give instructions that the public lamps should be lighted every night of the year, and not as hitherto on moonless nights only—which should add still more to the gas consumed in public lamps.

The action which I mentioned the other week as having been instituted by Mr. A. Scott, a Director of the Portobello Gaslight Company, against the Chairman of the Company and the other Directors, has been settled. The pursuer complained that he had not had notice of a meeting of shareholders for the appointment of a Liquidator to wind up the affairs of the Company, whose undertaking has now been taken over by the Edinburgh and Leith Gas Commissioners; and he had objection to the Liquidator who was proposed. The meeting which Mr. Scott complained of not having been summoned to, was not held; and he was sufficiently notified before the shareholders met. A Liquidator has also been agreed upon.

It seems that recently the Edinburgh and Leith Gas Commissioners, as a sort of experiment, introduced automatic prepayment meters into a number of houses of one and two rooms each, in a poor locality situated in Chessel's Court, Canongate. These supply gas at the rate of 24 cubic feet for 1d. After three weeks' use, the inhabitants of the houses have addressed the following letter to the Gas Commissioners: "We, the tenants of houses at No. 4, Chessel's Court, which you have supplied with automatic gas-meters, desire to express our gratitude for the boon which you have conferred upon us by enabling us to share, with our richer fellow-citizens, the benefits of gaslight in our houses. We highly appreciate the advantages we derive from these meters—namely, a better and a cheaper light, while obviating the dangers and inconveniences of oil-lamps. We venture to hope that these benefits may soon be extended to other householders of our own class." This is such an unusual production, that it naturally gives rise to the belief that its author is rather to be found within the ranks of the Gas Commission than among the denizens of Chessel's Court. So far as the statement of fact is concerned, I have no doubt that the document expresses the opinion of the alleged authors; but the sense of gratitude, and the philanthropic breathings with regard to other householders, are feelings which do not spring spontaneous in the breasts of the class of people here involved. The conclusion I come to is that, the Commissioners being at present informing themselves as to the number of dwellings in which no gas is used, with a view to considering whether prepayment meters would be likely to pay, someone is endeavouring to manufacture cheap notoriety by forestalling their decision.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Dec.* 19.

Sulphate of Ammonia.—There has been more buying during the week, and the market has further improved. A large share of the business has been done in Scotland, where up to £7 10s. f.o.b. Leith was paid some days ago. The effect of this larger buying and advance in Scotland was to strengthen the other markets; and later in the week, and more orders having been placed in Hull and Liverpool, prices have hardened all round. At the close, the quotations are £7 10s. Leith, £7 8s. 9d. Hull, and £7 10s. f.o.b. Liverpool. Buyers have been covering their December sales, not trusting to the last week of the month, when deliveries are much impeded by holidays. But, in addition, there has been a fair amount of direct business. Consumers, however, are shy about following any advance; and their purchases have been mainly at prices current a week ago. In the forward position, there is good inquiry; and, at a slight premium, there would be large buyers January-March delivery. But makers decline to offer ahead; and speculators seem nervous about offering, unless at a stiff premium. Hence, beyond January, there has been very little actual business.

Nitrate of Soda is quiet, but steady, at 7s. 10½d. per cwt. for ordinary, and 8s. per cwt. for fine quality, on spot. Due cargoes are worth 7s. 9d. per cwt.

LONDON, *Dec.* 19.

Tar Products.—A little more business is being done; but, generally speaking, the market is still languid. A determined effort is being made to depress the price of benzols. The lower quotations are quite inconsistent with the pressure that buyers are exercising in getting stuff forward. The eagerness for deliveries is very marked. There are no stocks of benzols in makers' hands; and there is, therefore, no reason for the collapse in prices which is taking place. Pitch is moving off more freely; but there is some hesitancy in booking new business forward. The higher prices of fuel, and the greater activity of the world, must sooner or later affect the consumption, and therefore the value, of pitch. Makers would, therefore, be wise not to lend themselves to the efforts of some dealers to drop prices still farther. There is more interest in anthracene, and some outside lots have been taken off the market at relatively good prices.

The following quotations represent the week's market: Tar, 18s. to 25s. Pitch, 25s. to 28s. Benzols, 90's, 2s. 10d.; 50's, 2s. 5d. Solvent naphtha, 1s. 6d. Crude, 30 per cent., naphtha, 1s. 2d. Creosote, 1⅛d.; liquid, 2⅛d. Heavy oils, 4os. Naphthalene, 65s.; salts, 32s. 6d. Carbolic acid, 60's, 2s. 2d. Anthracene, "A," 10d.; "B," 8d. to 9d.

Sulphate of Ammonia is looking better for January delivery, while for spot parcels £7 7s. 6d. to £7 10s., less 3¼ per cent., is readily obtainable. Makers are holding for £8, less 3¼ per cent., for January delivery. There is an excellent inquiry from all sorts of sources, which is sure to influence for the better this long drooping market.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—A steady demand is reported generally in the coal trade here, with prices well maintained at late rates. Steam and forge coals are in good demand; the present output generally meeting with a ready sale. As regards engine fuel, with increasing supplies offering on the market, the inferior sorts show here and there some slight giving way in price; but the better qualities are firm at late rates, with a hardening tendency in some cases. At the pit mouth, average quotations remain at about 10s. 6d. to 11s. per ton for best Wigan Arley; 8s. 6d. to 9s., for Pemberton four feet and seconds Arley; and 6s. 6d., for steam and forge coal. The shipping trade continues active, with, however, no further upward move in prices. From 7s. 9d. to 8s. per ton represent the average for good ordinary steam coal, delivered at Mersey ports; 8s. to 8s. 3d., delivered at the Partington tips on the Ship Canal; 7s. 6d. to 7s. 9d., delivered at Manchester Docks.

Northern Coal Trade.—There is this week an increased volume of trade in coal in the North; and the prices are in some instances higher. The want of gas coal is felt; and with the consumption at its highest point, there is an improved price obtainable for any quantity beyond that contracted for. In the steam coal trade, values are a little stronger. About 7s. 9d. per ton f.o.b. is now the price for best Northumbrian steam coals; second qualities being 7s. 3d. per ton. Gas coals are now being delivered in the largest quantities of the year—chiefly on the long contracts at old prices. Where additional supplies are needed, 7s. 6d. per ton f.o.b. is the lowest quotation; and for one

cargo, as much as 8s. per ton has been paid to obtain early delivery. There is no alteration this week noticeable in the manufacturing coal trade; but the deliveries are a little less, as usual before the holidays. Prices of gas coke are unaltered this week.

Scotch Coal Trade.—There is little new to record, either with regard to markets or prices, for the past week. The men's agitation is hanging back, and is not likely to be heard much of till after the New Year Holidays. The prices quoted are: Main, 6s. 9d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 6d.; and splint, 7s. 6d. to 7s. 9d. The shipments for the week amounted to 127,956 tons—a decrease on the preceding week of 13,423 tons, and on the corresponding week of last year of 10,904 tons. For the year to date, the total shipments have amounted to 7,480,628 tons—an increase over the same period of last year of 247,419 tons.

The Reconstruction of the Leatherhead Gas Company.—At a largely-attended extraordinary general meeting of the Leatherhead Gas Company last Thursday, under the presidency of Mr. G. Brown, a resolution was adopted authorizing the winding up of the Company, with Mr. T. Haynes, the Secretary, as Liquidator. A scheme of reconstruction was then brought forward, and embodied in two resolutions, providing that a new Company shall be formed, under the name and style of "The Leatherhead Gas and Lighting Company, Limited," with a nominal capital of £30,000, divided into 3000 shares of £10 each. The whole of the undertaking, business, assets, and liabilities of the old Company will be transferred to the new one, who will continue to carry on the gas supply to the town.

The Proposed Additions to Sandwich Gas-Works.—At a special meeting of the Sandwich Town Council last Friday, the Mayor (Mr. W. J. Hughes) introduced the recommendation of the Gas Committee that the Local Government Board should be asked for powers whereby a loan could be obtained for gas-works purposes. The Mayor said it must be remembered that the gas undertaking was a purely commercial one, and if the Council meant it to pay, they must carry on business on commercial principles. They had already spent £112 on repairs; and it was now found that they required new plant, &c., which would cost about £1216. They estimated their sale of gas in one year at 7 million cubic feet, which at 4s. 7d. per 1000 feet gave them £1604, from which they had to deduct £160 for loss in distribution, and £19 for discount allowed for public lamps; leaving in round figures £1424, which by the public lighting, the hire of lamps, and meters, was brought up to £1510. The cost of producing the gas (after the sale of residuals) was put at £525; and other expenditure brought the total up to £750. Great care had been taken not to over-estimate the income or under-estimate the expenditure. In borrowing £8000, which would include £4600 paid to the Gas Company for the works, £71 for the valuation, and £602 in respect of other charges connected with the transfer, they would have to pay about £6 14s. 5d. per cent. if they could get the money at 3 per cent. The annual sums required to pay off capital and interest in 30 years would be £408; in 20 years, £537 13s. 4d.; and in 15 years, £670. It was unanimously resolved to make the proposed application.

The Gas Consumers of Tralee and the Cost of Public Lighting.—The gas consumers of Tralee have petitioned the Town Commissioners for a reduction in the price of gas. The Commissioners charge the consumers 5s. per 1000 cubic feet and light the public lamps out of the profits. The consumers claim that a fair proportion of the cost of public lighting should be levied on the rates, and the price of gas correspondingly reduced.

A Public Lighting Squabble at Ventnor.—A little passage of arms has lately taken place between the Surveyor of the Ventnor District Council and the Secretary of the Gas and Water Company (Mr. J. S. Ineson), which reveals the suspicion with which everything done by a gas company's official is regarded by many people, especially by members of local authorities. It appears that, when some of the Company's men were fixing a new lamp, they noticed that the by-passes on the incandescent lamps had been tampered with. These when fixed by the Company were adjusted to give a ¾-inch flame; but they were found to be giving a flame of 1½ inches. A man at once readjusted them, and called upon the Surveyor and acquainted him with the fact; stating that if he would in future send the mantles to the Company, they would be fixed at the same time as the burners, whereby expense would be saved, and tampering with them prevented. This fact was brought under the notice of the Council by a member, who stated that a letter had been received by the Surveyor from Mr. Ineson, giving notice "that the Company would not allow in future any person to put new mantles on their incandescent burners unless they were supplied by the Company;" and the speaker remarked that "this sort of thing was getting almost beyond bearing." This was the version of the story presented by the worthy councillor. However, Mr. Ineson very promptly put the Council in possession of the facts, in a letter which came before them at their meeting on the 10th inst. He told them plainly that the Company had no desire to provide the mantles; but that, even if they had written to the Surveyor in the terms stated, they would have been acting quite within their legal rights. As to the "sort of thing" which was "getting almost beyond bearing," he pointed out what it meant to the ratepayers—viz., that whereas the ¾-inch flame consumed about one-fourth of a cubic foot of gas per hour, one twice the size would burn four times the quantity. Another grievance was manufactured out of the fact that Mr. Ineson had purchased a meter for a public lamp without the permission of the Council; and this was characterized as a "high-handed proceeding." Mr. Ineson quietly directed the attention of the Council to section 25 of the Gas-Works Clauses Act, 1871; and showed that the so-called "high-handed proceeding" was simply the carrying out of the Company's statutory obligations to provide the meters, governors, and burners used in the public lamps. Complaints are frequently made in the Council that the town is badly lighted. But Mr. Ineson pointed out that this is not the fault of the Company, as all they have to do is to supply the gas—the lighting and extinguishing being in the hands of the Council's servants. The Company have never received a request to improve the lighting, which, with modern appliances, could be done to the extent of six or eight times the present illumination without increase of cost. As the Surveyor was not present when Mr. Ineson's letter was read, its consideration was deferred.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 1230.)

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	15 Oct.	10½	Alliance & Dublin 10 p. c.	23—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	17½—18½	..	4 1 1
300,000	100	1 July	5	Australian (Sydney) 5% Deb.	107—110	..	4 10 11
200,000	10	29 Oct.	5	Belgrano (B. Ayres), Limited	10¼—11	..	4 10 11
100,000	Stck.	26 June	5	Do. 5 p. c. Deb. Stk	104—107	..	4 13 5
200,000	5	12 Nov.	6½	Bombay, Limited	7⅞—8¼	..	3 18 9
40,000	5	,,	6½	Do. New, £4 paid	5¾—6¼	..	4 3 2
380,000	Stck.	13 Aug.	12	Brentford Consolidated	285—290	..	4 2 9
210,000	,,	,,	9	Do. New	215—220	..	4 1 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	11 Dec.	4	Do. 4 p. c. Deb. Stock.	130—134*	..	2 19 9
220,000	Stck.	16 Sept.	11½	Brighton & Hove Original	242—247	..	4 13 1
208,820	,,	,,	8½	Do. A Ord. Stk.	185—190	..	4 9 5
933,500	Stck.	28 Aug.	5	Bristol, 5 p.c. max.	127—132	..	3 15 9
420,000	20	15 Oct.	11½	British	56—57	..	3 18 11
50,000	10	28 Aug.	11½	Bromley, Ordinary 10 p. c.	22—23	..	5 0 0
71,000	10	,,	8½	Do. 7 p. c.	19—20	..	4 5 0
500,000	10	15 Oct.	6	Buenos Ayres (New) Limited	10⅛—10⅜	..	5 11 8
200,000	100	1 July	6	Do. 6 p. c. Deb.	103—105	..	5 14 3
150,000	20	15 July	8½	Cagliari, Limited	29—31	..	5 6 5
100,000	10	30 Sept.	6	Cape Town & District, Ltd.	16½—17½	..	3 8 8
50,000	50	3 Nov.	6	Do. 6 p. c. 1st Mort.	57—59	..	5 1 8
550,000	Stck.	15 Oct.	13½	Commercial Old Stock	338—343	..	3 18 8
165,000	,,	,,	10½	Do. New do.	255—260	..	4 0 9
165,000	,,	11 Dec.	4½	Do. 4½ p. c. Deb. do.	150—155*	..	2 18 0
800,000	Stck.	12 June	13	Continental Union, Limited.	268—273	−2	4 15 2
200,000	,,	,,	10	Do. 7 p. c. Pref.	220—225	..	4 8 11
51,600	Stck.	28 Aug.	14	Croydon Com'cial A 10 p. c.	315—320	..	4 7 6
163,400	,,	,,	11	Do. B 7 p. c.	250—255	..	4 6 3
535,000	Stck.	28 Aug.	5½	Crystal Palace Ord. 5 p.c. Stk	140—143	..	3 13 5
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	15 July	11	European, Limited	26—27	..	4 1 6
354,050	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 11
5,746,590	Stck.	13 Aug	12¾	Gaslight & Coke, A, Ordinary	315—320	+5	3 19 8
100,000	,,	,,	4	Do. B, 4 p. c. max.	110—115	..	3 9 7
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	305—315	..	3 3 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	147—152	..	3 5 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	212—217	..	3 9 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	207—212	..	3 6 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	305—315	..	3 3 6
476,000	,,	,,	6	Do. K, 6 p. c. Prf.	172—177	..	3 7 10
1,061,150	,,	11 Dec.	4	Do. 4 p. c. Deb. Stk.	137—142*	..	2 16 4
294,850	,,	,,	4½	Do. 4½ p. c. do.	150—155*	..	2 18 0
908,000	,,	,,	6	Do. 6 p. c. do.	203—208*	..	2 17 7
70,000	10	29 Oct.	6	Hongkong & China, Limited	12—13	..	4 12 4

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
3,870,000	Stck.	12 Nov.	12	Imperial Continental	213—218	−2	5 10 1
376,400	100	1 Aug.	4	Do. 4 p. c. Debs. Red.	100—103	..	3 17 8
473,600	Stck.	13 Aug.	3½	Do. 3½ p. c. Deb. Stk	108—110	..	3 3 8
75,000	5	11 Dec.	6	Malta & Mediterranean, Ltd.	5¾—6¼*	−¼	4 16 2
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	111—115	..	4 6 11
250,000	100	,,	4½	Do. 4½ p. c. Debs.	108—110	..	4 1 10
541,920	20	12 Nov.	5	Monte Video, Limited	16—17	..	5 17 8
150,000	5	26 Nov.	8	Oriental, Limited	8¾—9	..	4 8 11
135,000	5	,,	8	Do. New, £4 10s. paid	7¾—8	..	4 10 0
15,000	5	,,	8	Do. do. 1879, £1 paid	1¾—2	..	4 0 0
60,000	5	16 Sept.	7	Ottoman, Limited	5—5½	..	6 7 3
420,000	100	2 Nov.	6	People's Gas } 1st Mtg. Bds.	102—107	..	5 12 1
500,000	100	1 Dec.	6	of Chicago } 2nd Do.	100—105	..	5 14 3
250,000	10	30 Sept.	10	San Paulo, Limited	13—14	..	7 2 10
5,475,000	Stck.	13 Aug.	5⅝	South Metrop., 4 p.c. Ord.	145—149	..	3 9 9
820,000	,,	15 July	5	Do. 5 p. c. Deb. Stk.	171—174	..	2 17 6
60,000	Stck.	16 Sept.	11½	Tottenham & Edmonton, A	270—280	..	4 2 3
60,300	,,	,,	8½	Do. B	180—190	..	4 9 5
170,380	10	29 May	10	Tuscan, Limited.	14—15	..	6 13 4
149,900	10	1 July	5	Do. 5 p. c. Debs. Red.	101—103	..	4 17 1
				WATER COMPANIES.			
746,123	Stck.	26 June	10½†	Chelsea, Ordinary	338—343	..	3 1 3
150,000	,,	,,	5	Do. 5 p. c. Pref.	177—182	..	2 14 11
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1875	160—164	..	2 14 10
175,785	,,	30 Sept.	4½	Do. 4½ p. c. Deb. Stock	162—167	..	2 13 11
1,719,514	Stck.	15 Oct.	7	East London, Ordinary	228—233	−2	3 0 2
554,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	163—168	..	2 13 7
225,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	105—107	..	2 16 1
700,000	50	11 Dec.	7½	Grand Junction, 10 p.c. max.	115—120*	−2	3 2 6
295,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	150—155	..	2 11 7
708,000	Stck.	13 Aug.	12	Kent	335—345	..	3 9 7
160,000	,,	,,	7	Do. New, 7 p. c. max.	215—220	..	3 3 7
1,043,800	100	26 June	9½†	Lambeth, 10 p. c. max.	275—280	+2	3 7 10
406,200	100	,,	7½	Do. 7½ p. c. max.	225—230	..	3 5 2
350,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	150—153	..	2 12 3
500,000	100	13 Aug.	12⅝	New River, New Shares	-418—423	..	3 1 0
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk.	150—155	..	2 11 7
902,300	Stck.	12 June	6†	S'thwk & V'xhall, Ordinary	152—157	..	3 16 6
126,500	100	,,	6†	Do. Do. 7½ p. c. Max.	148—153	..	3 18 5
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	175—180	..	2 15 6
1,019,585	,,	30 Sept.	4	Do. 4 p. c. A Deb. Stk.	148—152	..	2 12 7
1,155,066	Stck.	11 Dec.	10	West Middlesex	310—315*	..	3 3 6
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	163—168*	..	2 13 7

† Next dividend will be at this rate. *Ex div.

The Dover Gas-Works Reading and Recreation Room.—The ninth anniversary celebration of the opening of the reading and recreation room at the Dover Gas-Works took place on Monday last week. All the members were for the evening the guests of Mr. W. Mannering (the Chairman of the Company), who, with other gentlemen, including Mr. R. Herring, the Engineer and Manager, who is the President of the room, addressed a few remarks to them, which were well received. Mr. W. Mannering gave an interesting lecture descriptive of a "Holiday Trip in Switzerland," which was illustrated by magic-lantern views, shown by Mr. E. Mannering; appropriate music being supplied. At the conclusion of the lecture, a smoking concert was held. Before separating, each member was presented with an illustrated volume of "Friendly Greetings" from the works library. The rooms were prettily decorated with flowers; and altogether a very pleasant evening was spent.

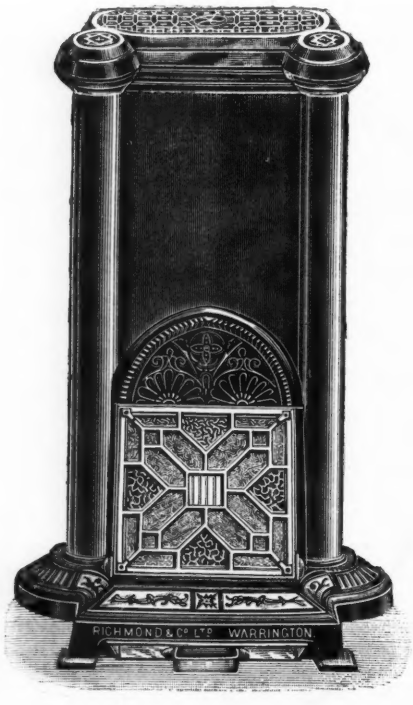
The Fatal Explosion of Acetylene in Berlin.—The German Emperor has manifested considerable interest in the acetylene disaster in the Moabit quarter of Berlin, which was reported in the "JOURNAL" last week; and he has directed the Home Minister to report to him on the matter. According to the correspondent of the "Standard," the explosion was so terrific that a section of an iron boiler, weighing about 50 lbs., was completely bent, and hurled some 60 or 80 feet on to the roof of a house. All the four victims had wives and children. The actual cause of the accident has not been, and probably never will be, discovered. It seems likely, however, from statements Herr Isaac made to his acquaintances as to the proportions in which he had been mixing acetylene gas with air, that he was quite unaware of the dangerous properties of the gas. A similar explosion occurred in Berlin seven months ago, in the laboratory of M. Raoul Pictet, resulting in injury to two people, and considerable damage to property—a disaster which, it will be remembered, was followed by the fatality at his establishment in Paris.

The Middlesex County Council and the Water Question.—The Middlesex County Council have resolved to oppose the whole of the Water Bills of the London County Council, the New River Bill, and that of the East London Water Company. With reference to the former, Mr. Bigwood, M.P., and Sir R. Nicholson, representing the Council, saw Mr. W. H. Dickenson, Mr. M'Kinnon Wood, and Mr. H. L. Cripps, on behalf of the London County Council; and in the result it was resolved that the latter should submit some proposals in writing on the matter. The principal point of objection in regard to the East London Bill is that it takes a very large tract of Lammas land. With respect to that of the New River Company, the Bill itself has not been before the Council; but it provides for the connection of the Company's system with the Staines reservoirs. Mr. Gibson pointed out, at last Thursday's meeting, that the undertaking at some time would be purchased; and if the pipes all went through private land, as shown by the scheme, it would make the purchase much more expensive. He did not see why the usual course of laying the pipes in the road should be departed from. This should, he thought, be a ground of objection. Mr. Bigwood, as Chairman of the Parliamentary Committee, saw no objection to it.

A New French Acetylene Company.—There has just been formed in Paris, under the title of La Société Française de l'Acétylène Industriel Pur, Raoul Pictet, a company with a capital of £100,000. It is to be presumed that the new undertaking is for the supply of acetylene for purposes of illumination.

The Water Supply of Kingsbridge.—A scheme for supplementing the existing water supply of Kingsbridge was recently submitted to the District Council of the place by Mr. F. Beesley. He estimates that the daily average requirement of the town is 72,500 gallons, of which the existing works supply 37,500 gallons; leaving 35,000 gallons to be provided. He has taken gaugings of springs on what is known as the Burrough Estate; and since June he has found a varying flow of from 30,000 to 63,000 gallons in 24 hours. The supply is likely to be permanent; and he recommends that steps should be taken to acquire the springs and construct the necessary works. These are to include receiving tanks at the springs and a covered service reservoir with a capacity of 219,000 gallons, equal to six days' full supply, besides the repairing and covering of the old reservoir. Mr. Beesley reckons the cost at £3188, exclusive of land, engineering, and easements. The Council adopted the scheme, and decided to at once apply to the landowners for terms for the land and the water rights. It was suggested by one of the speakers that a loan of £5000 would probably cover the total outlay.

The Hunstanton District Council and the Gas and Water Companies.—At a meeting of the Hunstanton District Council last Wednesday, the position of that body in connection with the Gas and Water Companies, to which reference was made in the "JOURNAL" for the 1st inst., was under consideration. The Chairman (Mr. W. Pattrick) said the first intimation the Council received of the intention of the Companies to apply to Parliament for power to dissolve and re-incorporate in one Company, was by the publication of the advertisement. Their Clerk and himself had been to London to learn what rights the Companies possessed under their present leases, and to ascertain with what advantage the Council might oppose the Bill. The leases had been seen, and a conference had taken place between the Clerk and Messrs. Baker and Co., the Parliamentary Agents. They stated that the Companies had probably applied for an Act in order to increase the value of their property; and there would be no difficulty in getting clauses inserted giving the Council the option of purchase within two years. It was the duty of the Council, under the circumstances, to petition against the Bill, and to take steps for the insertion of clauses for the protection of the consumers; and also to promote a Bill of their own. This advice had been acted upon. The steps taken were approved by the Council; and it was also resolved to write to the Secretaries of the Gas and Water Companies expressing the surprise of the Council that action to procure parliamentary powers should be applied for while negotiations between the Council and the two Companies were proceeding. The Chairman said the shareholders had not been considered in the matter. Mr. Le Strange (who has retired from the directorate of the Companies in consequence of their action) said this was perfectly true. The petition against the Bills was then sealed.



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Only fitted for Flue when ordered.

Non-condensing (Nos. 553 & 1553) recommended.

Cromer Gas Company.—The annual general meeting of this Company was held on Monday last week—Mr. G. Breese presiding. In moving the adoption of the report and accounts, the Chairman said they had increased the last dividend by 1 per cent., making it 7 per cent., which was most satisfactory when it was remembered that the price of gas had been reduced 3d. per 1000 cubic feet. Part of the credit was due to the Directors, and part to the Manager (Mr. J. K. Frost). The Secretary (Mr. P. E. Hansell) said he had been looking through some old reports of the Company, and found that in 1878 they had some difficulty in paying 2½ per cent.; the capital at that time being £5000, as compared with £12,000 now. The motion was carried unanimously.

The Kent Water Board Bill.—Sir John Lubbock, whose country residence is in the district of the Bromley Union, has expressed his great satisfaction with the Bromley Urban District Council in withdrawing from the combination of West Kent authorities who are promoting the Kent Water Board Bill. Sir John points out that the Kent Water Company are now paying their maximum dividend, and the purchase, if effected at all, would have to be on this basis; so that there would not be any reduction in the water-rate. There are, on the contrary, circumstances which convince him that there would be an increase in the rate. The Erith Urban District Council have now withdrawn from the promotion of the Bill; and the Bexley Council have declined from the first to join. So that now the Dartford Urban and Rural District Councils, the Bromley Rural District Council, and the Beckenham Urban District Council are the only authorities who are in the combination.

The Defective Reservoir at Redruth.—The work which has been carried out during the past few months with a view to making the new reservoir at Redruth water-tight, has now been completed. Water is being turned into the reservoir; and, in order that it may be filled and thoroughly tested before the end of the year, the District Council have decided to supplement the gravitation supply to the reservoir by means of pumping. A short time since, Colonel J. T. Marsh, R.E., a Local Government Board Inspector, held an inquiry respecting an application by the Council for permission to borrow £1500 for purposes of water supply. It was explained that Mr. A. Delbridge, the Contractor for the reservoir, had agreed to make it secure and keep it so until Jan. 1, 1898, for £510; the original cost of the work having been £2980. The Council considered this work an extra, and not in the nature of repairs. The remainder of the proposed loan was required for procuring auxiliary supplies for other than domestic purposes in the summer, the building of walls round the reservoir, and the erection of stand-pipes in different parts of the town. In explanation of the difficulty of obtaining an adequate supply of water in the district, the Clerk to the Council (Mr. H. Paige) said the neighbourhood had been so undermined that the springs had been cut away. In summer, Redruth had practically to find water for the whole locality—farmers even coming in for water for their cattle, as well as for that required for domestic consumption. The Inspector remarked that people outside had no right to take water provided by the Council.

Oil Motors for the Glasgow Tramways.—The Tramways Committee of the Glasgow Town Council have had under consideration an offer to equip every tramway route in Glasgow with cars drawn by mechanical traction, and to run them for seven years, at a cost to the Tramway Department not exceeding what is at present paid for horse haulage. At the end of the period named, the promoters undertake to hand over to the Corporation, as a free gift, the whole of the cars, with their motors, in good working condition, and free of any charge for royalties. The motor proposed is on the oil principle, and is understood to be the joint patent of Sir William Arrol and Mr. G. Johnstone. The Committee have decided to give all reasonable facilities to the patentees. It is estimated that the present horse system costs the corporation £100,000 per annum.

Insufficient Water Supply at Colwyn.—A memorial complaining of the water supply, and urging an investigation thereinto, has been forwarded to the Local Government Board by a number of residents in the Colwyn district. The memorialists (who are property owners and ratepayers of the parish of Llysfaen, which is included in the Conway and Colwyn Bay water supply scheme) state that they are suffering, and have suffered for some time, from an insufficient supply of water. For a period of six weeks during the summer, no water reached their houses; and this was succeeded for a few weeks by an intermittent supply, which has now completely failed. The petitioners mention that they pay large sums towards the carrying out of the scheme, the early completion of which they believe to be of vital importance; and therefore they ask for the services of a Government engineer to inquire into the cause of the delay. The original contract was undertaken in 1891; and on Dec. 26 last, the expenditure had reached £41,768, to which must be added large sums spent on the works during the present year. It is estimated that from £10,000 to £15,000 is still required to complete the works.

Lead-Poisoning in the Mosborough District.—The residents in the Mosborough district are not satisfied with the steps the District Council are taking with a view to depriving the water of its mischievous action on lead. Another public meeting of those interested in the matter was held last Wednesday, when a communication was read from the Clerk to the District Council in reply to the resolution passed at the recent indignation meeting. The letter stated that the Council were doing their utmost to remedy the impure state of the water; and they hoped that in a few days their efforts would be successful. At the previous meeting, the medical officers present stated that a sensible improvement had taken place in the health of their patients, and that the water was practically free from lead. It was now stated, however, that soon after a heavy fall of rain occurred, the water was as bad as ever; and while on some days it was apparently free from lead, on others as much as 8 grains per gallon was recorded. With these facts before them, those present at the meeting concluded that the authorities were not in earnest in the matter, or someone was seriously at fault. After some discussion had taken place, it was resolved that, should no improvement be effected, the Local Government Board should be again approached on the subject.

New Condensing Stoves.
Nos. 770 & 771.

GAS-FIRE SEASON 1896-97.

BEFORE ORDERING, SEE OUR

NEW DESIGNS.

UNEQUALLED,

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LISTS, ON APPLICATION, FROM

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BIRMINGHAM & LONDON.

THE OLDEST AND LARGEST GAS-STOVE MAKERS IN THE WORLD.

The Gas-Works Purchase Question at St. Anne's.—The St. Anne's Urban District Council during the past week made final overtures to the Directors of the Gas Company so as to obviate the necessity of applying to Parliament for powers to compulsorily acquire the undertaking. Again the efforts were in vain; the Directors declining even to negotiate, much less sell their works. The Council will now proceed.

The Charge for Public Lighting at Morecambe.—Reference was made to this question at the meeting of the Morecambe District Council, on Monday last week, by Mr. Bellamy, the Chairman of the Lighting Committee. He said a deputation had been appointed to wait on the Directors of the Gas Company to discuss a proposed new agreement for the public lighting. The present one was made in 1891; and the price of gas for the street-lamps was fixed at 3s. 6d. per 1000 cubic feet. At that time the charge to private consumers was 3s. 11d. The Directors, instead of receiving the deputation, asked for the representations of the Council to be submitted in writing; and a sliding-scale of charges was prepared by the Council varying from 2s. 3d. to 3s. per 1000 cubic feet, according to the amount of gas consumed. Since the date of the contract, the price of gas to private consumers has been reduced to 3s. 5d.; and the Council thought they should have the same concession. The Directors, however, replied that, on the expiration of the present agreement, they would be prepared to enter into a new one, the charge to be arranged on the sliding-scale; but the price submitted was considerably higher than that suggested by the Council. He (Mr. Bellamy) thought the charges proposed by the Directors were simply ridiculous; and they so impressed the Committee that they recommended the Council to give the Company six months' notice to terminate the agreement. Mr. Harper coincided with what Mr. Bellamy had said; for he was of opinion that, in all fairness, the ratepayers should know exactly what the Directors wanted to do with the Council. During the past year they had consumed 4 million cubic feet of gas; and for this amount the Directors proposed to charge 3s. 3d. per 1000 cubic feet, or only 2d. less than the price charged to the smallest private consumer. The Chairman remarked that, when the agreement was entered into, the local authority did not know the Company were going to reduce the price to private consumers. Mr. Fawcett asked how the Council could expect consideration at the hands of the Company when they (the Council) were going to put the electric light in competition with them. The recommendation was adopted.

The Search for Coal in East Anglia.—The Eastern Counties Coal Boring Association have decided, on the advice of the geologists consulted, not to proceed further with the boring for coal at Weeley, Essex. A bore undertaken there has been carried without result to a depth of 1178 feet. It is thought probable that another boring will be commenced at some point in Essex, Suffolk, or Norfolk.

The interest due on the 1st prox. on the 6 per cent. debenture bonds of the Cantareira Water Supply and Drainage Company of Sao Paulo will be paid by the British Bank of South America, on and after that date.

The Monte Video Gas Company, Limited, notify debenture holders that the half-yearly interest coupon No. 12 (due Jan. 1, 1897) of the 5 per cent. debentures, will be payable on and after that date at the London and County Bank, 21, Lombard Street, E.C.

We have received from Messrs. John Wright and Co., Limited, a copy of the latest complete catalogue of their gas cooking and heating apparatus. It is a highly creditable production, extending to 130 pages, and is a great advance upon anything of the kind hitherto introduced. The catalogue proper is prefaced by views of Messrs. Wright's works, and some appropriate remarks on the economy and other advantages of cooking by gas.

Arrol-Foulis stoking machinery has been in use at the Linacre Gas-Works, Liverpool, for some years; and last summer it was decided to increase the plant by the addition of four drawing-machines and two sets of hydraulic pumping-engines and accumulators. We learn that these have lately been started, and are doing their work in a very satisfactory manner. In addition to the above machinery, Sir William Arrol and Co. are making four of their self-propelling charging-machines and some very large hoppers, elevators, and coal-breakers for the same works. This system of stoking has lately been very largely adopted, and a considerable number of machines have been erected and put to work in London. At the Wapping station of the Commercial Gas Company, the coal is supplied to the chargers by means of a hydraulic crane and grab, fixed to the machine itself. This arrangement was suggested by Mr. H. E. Jones, the Chief Engineer of the Company, to meet his special requirements; and we believe it has been found to work very successfully.

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PATENT GAS EXHAUSTERS AND ENGINES.

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Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

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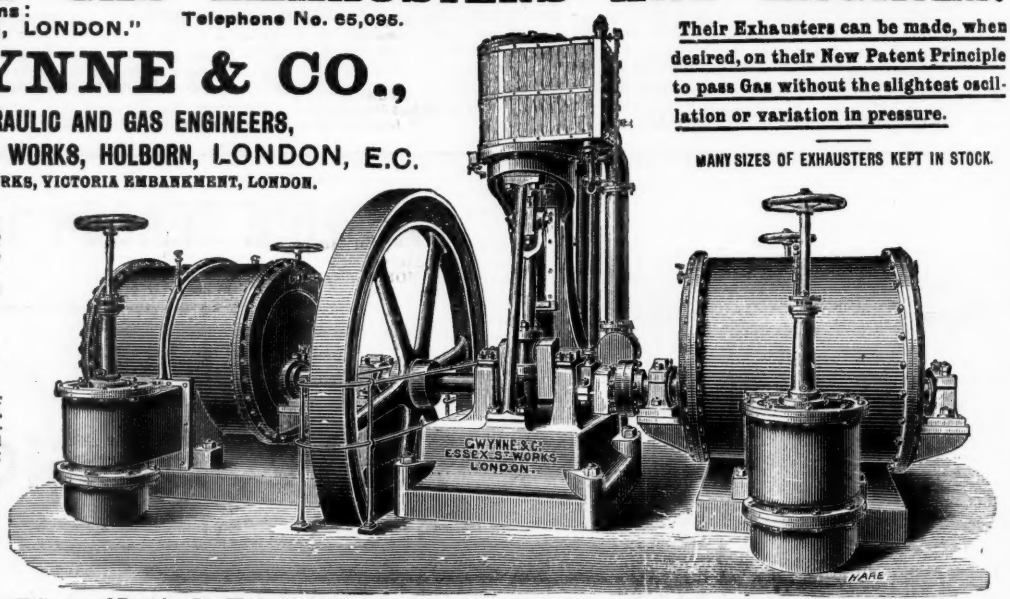

Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

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[For Illustrated Advertisement see Dec. 1, p. 1050.]

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SITUATION wanted, by a competent "Three-Branch" PLUMBER. Constant Employment, rather than high Wages, required. Age 37; Single. Several Testimonials as to good workmanship, steadiness, and industry. Position in the Lancashire or Yorkshire District preferred.
Address No. 2765, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Secretary and Manager combined, for a Gas-Works producing 16 Million Cubic Feet of Gas per annum.
All Particulars may be obtained from, and applications addressed to, HY. CROSS, Esq., Solicitor, Prescot, LANCS.

WANTED, by the Gas Committee of the Corporation of Wigan an OUTDOOR FOREMAN. Wages £2 2s. per week.
Particulars of the duties may be obtained from, and applications addressed to, the undersigned.
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WANTED, a Manager to take charge of a Country Gas-Works, carbonizing about 1100 Tons of Coal yearly. House, Garden, Gas, and Coal found.
Applications, with Testimonials (not exceeding four), stating Salary required, to be sent to the undersigned on or before the 1st of January, 1897.
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Apply to JOSIAH HARDMAN, Milton, STAFFS.

WANTED, to purchase Gas Carbon delivered at nearest Station to Gas-Works, in quantities of not less than 4 tons.
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WANTED, a Second-hand, double action STEAM-PUMP for pumping Tar and Liquor—2-inch, 2½-inch, or 3-inch Suction.
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Two HORIZONTAL ENGINES, by F. Horne, of London, fitted with Air-Pumps, for use with Surface Condenser. Cylinders 18½-inch Bore, and 22-inch Stroke.
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One EXHAUSTER for 50,000 cubic feet per hour, by Waller, of London, with 14-inch Inlet and Outlet Valves and Connections.
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Two BYE-PASS GAS-GOVERNORS, complete.
One CORNISH BOILER, by Cochrane, Grove, and Co., 22 feet long by 6 feet diameter, with five Galloway Tubes, and all necessary Fittings, &c., fitted with Perret's Dust Furnace, with Vertical Engine, and Blower complete.
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THE Directors of the Worksop Gas Company invite TENDERS for the purchase of the surplus TAR and the AMMONIACAL LIQUOR made at their Works from the 1st of January to the 31st of December, 1897.
Tenders for Tar to state price per ton delivered into Purchaser's Tanks at the Worksop Railway Station.
Tenders for Liquor to state price per ton as tested by Twaddel's No. 1 Hydrometer, delivered into Boats near Company's Works, or price per ton delivered into Purchaser's Tanks at the Railway Station.
The Directors do not bind themselves to accept the highest or any tender.
Tenders to be sent in by the 29th of December.
Worksop, Dec. 7, 1896.

TENDERS FOR GAS COAL.

THE Magistracy of Copenhagen are prepared to receive TENDERS for the supply and delivery of 100,000 Tons of best GAS COAL during the Year 1897, from April to the end of December.
The Magistracy reserve the right to divide the Contracts between two or more Contractors.
Further Information and Conditions for the delivery may be obtained on application to the Lighting Department of Copenhagen, Vestre Boulevard, Copenhagen V.
The Tenders (sealed) to be sent to the Magistracy of Copenhagen, Fourth Division, before Dec. 30, 1896, Twelve o'clock, at which time the tenders will be opened in the presence of the parties tendering who are in attendance.
THE MAGISTRACY OF COPENHAGEN.
Dec. 18, 1896.

ILKESTON CORPORATION.
(GAS DEPARTMENT.)

REGENERATIVE SETTINGS.

THE Gas Committee of the Ilkeston Corporation invite TENDERS for the CONVERSION of Three Beds of Through Retorts at present heated by Direct Firing, into REGENERATIVE SETTINGS.
Full Particulars can be had of their requirements on application to the Manager (Mr. F. C. Humphrys), at the Gas-Works, Rutland Street.
Sealed endorsed tenders, addressed to the undersigned, to be sent in before Jan. 7, 1897.
The lowest or any tender will not necessarily be accepted.
WRIGHT LISSETT,
Town Clerk.
Town Hall, Ilkeston,
Dec. 12, 1896.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

GOODSON'S Patent Self-Acting Gas GOVERNORS and BURNERS.
For Illustrated Advertisement, see "JOURNAL" for Nov. 17, p. 988.
GOODSON AND Co., 213, Vauxhall Bridge Road, LONDON, S.W.

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

BOROUGH OF RICHMOND (SURREY) WATER-WORKS.

NEW STEAM-PUMPS, BOILERS, AND WATER-MAINS.

TENDERS are invited for providing for the Borough of Richmond (Surrey) Water-Works, as follows:—
1. Two new Direct-Acting, Compound, Duplex PUMPING-ENGINES (Worthington type), with Jet Condensers, each to raise 300 Gallons of Water per minute from a sumpt in the Engine-Room at the Works, against an average Pressure of 125 lbs. per square inch; the maximum Steam Pressure up to 80 lbs.
2. Two new TINKLER and SHENTON'S Steel Hyde Vertical Duplex BOILERS; daily working Pressure 80 lbs. per square inch.
3. A new STEAM CRAB or WINDING ENGINE for Deep Well, to wind from a depth of 290 feet, with Wire-Rope Guides.
4. WATER-MAINS of best Grey Metal. Sizes 2 inches up to 6 inches, coated with Dr. Angus Smith's Solution.
Specifications, with Form of Tender (for which a charge of One Guinea will be made as to No. 1 above, which will be returned on receipt of a *bonâ-fide* tender), and further Information may be obtained on application to Mr. W. G. Peirce, Borough Water-Works Engineer, Riverside, Richmond, Surrey.
No tender will be recognized unless properly filled up on prescribed form attached to Specification, nor unless the same is received at the Town Clerk's Office within the time limited; and no expenses or claim will be allowed or paid to any person whether tendering or not.
The Contractor will be required to enter into a Contract and Bond as security for the due performance of his Contract, as stipulated by the Public Health Act, 1875. The Form of Contract and Bond will be prepared by the Town Clerk, at whose Office particulars thereof may be obtained.
Sealed tenders, endorsed "Tender for New Steam-Pumps," or "Boilers, &c." (as the case may be), and addressed to the Chairman of the Water Committee, must be delivered at the Town Hall, Richmond, by Four p.m. on Tuesday, the 5th day of January, 1897.
FRED. B. SENIOR,
Town Clerk.
Town Hall, Richmond,
Surrey, Dec. 16, 1896.

PATENTS, DESIGNS, AND TRADE MARKS ACTS, 1883 to 1888.

NOTICE is Hereby Given, that the Whessoe Foundry Company, Limited, of Darlington, Co. Durham, have applied for LEAVE TO AMEND the SPECIFICATION of the Letters Patent No. 882 of 1896, for "Improvements in Preventing the Freezing of Gas in Gas-Mains, and Apparatus therefor, and for Carburetting Gas."
Particulars of the proposed amendments were set forth in the "Illustrated Official Journal (Patents)" issued on the 9th December, 1896.
Any person or persons may give notice of opposition to the Amendment (on Form G) at the Patent Office, 25, Southampton Buildings, London, W.C., within one calendar month from the date of the said "Journal."
(Signed) H. READER LACK,
Comptroller General.
G. F. REDFERN AND Co.,
Agents for the Applicants.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.
He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.
Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.
Offices: 18, FINSBURY CIRCUS, E.C.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

THE "COOMBE" DRAUGHT SCREEN
FOR INCANDESCENT BURNERS.
For Illustration and Statement of Advantages to be gained by its use, see "JOURNAL," Dec. 1, p. 1050.
ALFRED ARCULUS & CO., Glass Manufacturers,
BIRMINGHAM.

INCANDESCENT GAS-LIGHT.
The World-Famed best "TITAN" INCANDESCENT MANTLES at 40s.
The "TITAN" newly-invented COMPOSITION, of great durability for export, 70s.
BURNERS, 70s. per 100.
ADDRESS—
BROCHIER & HAHN,
NUREMBERG, BAVARIA.

HEBBURN MAIN GAS COALS.
Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.
For Prices, f.o.b. Ship or Delivered by Rail, apply to
THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.
W. RICHARDSON, Fitter.

NEWBATTLE CANNEL.
Highest Results in Gas, & Excellent Coke.
QUOTATIONS ON APPLICATION TO
THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

THE SILICA FIRE-BRICK
COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS,
BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY,
Strongly recommended where EXCESSIVE HEATS have to be maintained.

THOMAS TURTON
AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED,
— *v* —
"DE MARE" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.
— *v.* —
"SUNLIGHT" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, HEREBY GIVE NOTICE, as follows:—

VALIDITY.	The Company's Patent has been declared VALID ON ALL POINTS after a Fifteen-Day Trial.
NATURE OF INVENTION.	The Invention was described by Mr. Justice Wills as a "PIONEER INVENTION."
SCOPE OF PATENT.	The Patent HAS BEEN GIVEN A WIDE CONSTRUCTION; and it was held that the protection given by it was not confined to Mantles manufactured according to the particular prescriptions set out in the Specification.
SHAPE OF MANTLE.	The Judge held that a Mantle, even if made in a different form or shape (such as the "De Mare" Fringe or Plume), IS STILL AN INFRINGEMENT of the "Welsbach" Patent.
"DE MARE" JUDGMENT.	Judgment for an INJUNCTION, WITH FULL COSTS, has been given against the "De Mare" Incandescent Gas-Light System.
"SUNLIGHT" JUDGMENT.	Judgment was given AGAINST the "Sunlight" Incandescent Gas-Lamp Company, Limited, on the question of the VALIDITY OF THE PLAINTIFFS' PATENT.
"SUNLIGHT" MANTLES.	Last about 100 hours.
"WELSBACH" MANTLES.	Last about 1000 hours.
	"Sunlight" Mantles BURN DOUBLE THE GAS to produce the same candle power as the Incandescent Gas-Light Company's Mantles.
	Users of "Sunlight" Mantles are applying to the Incandescent Gas-Light Company to REPLACE THEM BY THEIR OWN MANTLES.
WARNING.	Users of the Incandescent Gas-Light Company's Mantles upon "Sunlight" Burners ARE INFRINGERS OF THE COMPANY'S PATENT, AND WILL BE AT ONCE PROCEEDED AGAINST.
COSTS.	Certificates of the Validity of the Company's Patent have been granted both by Mr. Justice Romer and Mr. Justice Wills entitling the Company to Solicitor and Client Costs, which will, IN ALL CASES, BE RIGOROUSLY ENFORCED.
INFRINGERS.	The Incandescent Gas-Light Company WILL TAKE PROCEEDINGS AGAINST ALL PERSONS INFRINGING THEIR PATENT, WHETHER MAKERS, WHOLESALE DEALERS RETAILERS, or USERS.
"LIMITED LICENSE" WARNING.	Users of the Company's Mantles upon Burners not sold by the Company ARE INFRINGERS. Judgments have already been obtained against such users from Mr. Justice Chitty, Mr. Justice Stirling, Mr. Justice Kekewich, and Mr. Justice North.

FAITHFULL & OWEN,
11, Victoria Street
Westminster.
Solicitors to the Incandescent Gas-Light Company, Limited.

April, 1896.

HOLMSIDE GAS COALS.
PRESENT DAILY PRODUCE OVER 4000 TONS.
LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.
Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.
HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.
PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.
RESULTS OF DIFFERENT ANALYSES:—
Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash . . . . . 1·34 Per Cent.
Tar . . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.
The HOLMSIDE and SOUTH MOOR COALFIELD possesses *a very great quantity of the best Coal*; and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*
These Coals may be bought through the Principal Merchants in England, or direct from
MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

THE NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING COMPANY, LIMITED.

THE SUNLIGHT COMPANY having finally beaten the Welsbach Company in the Law Courts, notwithstanding the misleading statements which are being advertised, the Legal Position of its Mantle is now

ESTABLISHED BEYOND ALL QUESTION.

Mr. JUSTICE WILLS says in his Judgment: "No use is made by the Defendants (the Sunlight Company) of any of the rare earths; and their choice of substances, and their method of applying the illuminants, appear to me to be as wide asunder as the poles from those contemplated by Welsbach."

Therefore any interference with our Customers by the Incandescent Company in their use of our Mantles, either on our Burners *or on theirs*, should be promptly reported. **It will at once be summarily dealt with by us, without cost to our Customers.**

THE **SUNLIGHT MANTLE** GIVES A **SOFT MELLOW LIGHT**, VERY **AGREEABLE TO THE EYESIGHT**, AND HEIGHTENS THE **DECORATIVE EFFECT** OF PLEASANT COLOURS.

WE ARE PREPARED TO **MAINTAIN ALL BURNERS FITTED BY OURSELVES** AT A VERY LOW PRICE PER ANNUM; AND **SPECIAL TERMS** FOR **RENEWAL MANTLES** WILL ALSO BE MADE TO THOSE WHO PREFER TO DO SO THEMSELVES.

THE NEW INCANDESCENT (SUNLIGHT PATENT) GAS LIGHTING COMPANY, LIMITED,

33 & 34, SHOE LANE, LONDON, E.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

Shipments Promptly and Carefully Executed.

London Office: R. Cull, 81, Old Broad St., E.C.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, near DEWSBURY.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

Note.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day. Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

For Prices and Particulars, apply to

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

Analysis—

Yield of Gas per ton	10,500 Cubic Feet.
Illuminating Power	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For Prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON,

Fitter.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.

See Advertisement in last and next issue.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. Edward Price, 119, Queen's Road, Finsbury Park, N.

Prices are Reduced.

The Cheapest House in the Trade for

LEVER LOCKS

FOR

GAS-METERS.

Joseph Oakley & Co.

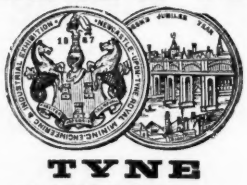
Excelsior Works,

WILLENHALL.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.



TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

Coal Owners, Newcastle-on-Tyne;

or

E. FOSTER & CO.,

12, John Street, Adelphi, London, W.C.

OXIDE OF IRON.

NATURAL BOG ORE FROM OWN MINES.

Samples and Prices on application.

Wm. H. MÜLLER & CO.,

81, PALMERSTON BUILDINGS, LONDON, E.C.

TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

THE THAMES BANK IRON CO.

UPPER GROUND STREET, LONDON, S.E.,

SUPPLY FROM STOCK

CAST-IRON RETORTS,

AND ALL KINDS OF GAS-WORKS APPARATUS.

SOCKET-PIPES FOR GAS OR WATER PURPOSES.

FLANGE PIPES FOR STEAM.

Sole Manufacturers of **LYON'S "PATENT" GAS-MAIN SYPHONS.**

Agents for

ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF

WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.

PREPAYMENT METERS.

SIMPLE IN ACTION. POSITIVE IN RESULTS.

ROCK METER WORKS,

TELEPHONE No 2145
Telegraphic Address
AUTOMATIC MANCHESTER

THE Automatic Gas Meter 1895 Corporation Limited

Tortworth Street Strangeways

MANCHESTER.

AND AT

49 Queen Victoria Street

LONDON.

ORDERS PUNCTUALLY ATTENDED TO.

LONDON OFFICE
60, QUEEN VICTORIA ST. E.C.

TELEGRAPHIC ADDRESSES
"DRAKESON HALIFAX."
"ECLAIRAGE LONDON."

TELEPHONE No 43.
"HALIFAX EXCHANGE"

GAS ENGINEERS.
CONTRACTORS.
IRONFOUNDERS.

RETORT SETTERS.
FURNACE BUILDERS.
ETC. ETC.

JONAS DRAKE & SON

SOLE AGENTS FOR
HISLOP'S
PATENT REGENERATIVE FURNACES
—FOR—
ENGLAND, WALES & ABROAD.

RETORT BENCHES ERECTED COMPLETE
WITH OR WITHOUT SPECIAL FURNACES.
RESULTS GUARANTEED.

OVENDEN HALIFAX

Designs and Estimates on Application.

GASEOUS FIRING A SPECIALTY.

MOBBERLEY & PERRY
STOURBRIDGE.

Manufacture & supply best quality of

Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)

Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.

Contractors for the erection of Retort-Benches complete.

London Agents:

BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

WILLEY & CO., GAS ENGINEERS,

CONTRACTORS TO THE GOVERNMENT,

LONDON & EXETER.

Offices: HAVEN ROAD, ST. THOMAS, EXETER.

Engineering Works & Brass Foundries: ST. THOMAS, EXETER.

Meter Factories & Works: JAMES STREET, EXETER; and 248, KINGSLAND ROAD, LONDON.

LATEST SPECIALITIES.

WATER-GAS APPARATUS—A Model Plant in course of erection at their Exeter Engineering Works. Continuous Process; the best Results yet attainable.

COLUMNLESS GASHOLDERS—Makers of Gadd & Mason's Patent System.

Agents for the **MAXIM CARBURETTOR.**

GAS ENRICHMENT in bulk or on Outlet Main.

Makers of the **LIVESEY WASHER.**

Manufacturers of **WET AND DRY GAS-METERS.**

Their Patent **PENNY-IN-THE-SLOT AUTOMATIC METER,** admittedly one of the most perfect in the Market. Thousands in use in London and the Provinces.

Manufacturers of **GAS-FITTINGS** in endless variety—**CHANDELIERS, BRACKETS, PENDANTS, MAIN COCKS, &c., &c., &c. SPECIAL FITTINGS** for the Automatic Business.

Metropolitan Agent:

FRANK ACLAND, M.Inst.C.E., M.Inst.M.E., 76, Cheapside, E.C.

Telegraphic Address: "WILLEY, EXETER." Telephone 132. Established over 30 Years.

EXCHANGE TELEPHONE: NO. 1756 BANK.

J. & H. ROBUS,

TELEGRAPHIC ADDRESS: "ROBUSTNESS, LONDON."

ENGINEERS & CONTRACTORS,

20, BUCKLERSBURY, LONDON, E.C.

Complete Erection or otherwise.

Gasholders, Tanks, and Reservoirs of all sizes.

Gas and Water Main Laying a Speciality.

Retort Setting a "Speciality." Inclined or Horizontal Settings (with or without Regenerative or Generative Furnaces) of the most approved and Economical Designs.

ESTIMATES SUBMITTED FOR

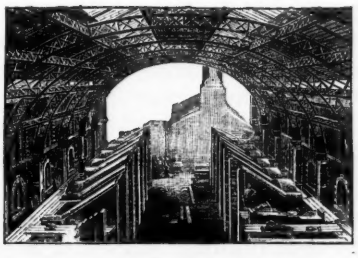
Gas and Water Work of Every Description.

Contractors to H.M. Government.

For Retort Advertisement, see last week's "JOURNAL."

W. C. HOLMES & CO.

IRONFOUNDERS AND CONTRACTORS.

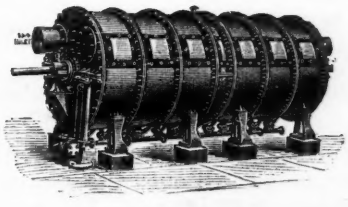


Makers of GAS & CHEMICAL PLANT.

Telegrams: "HOLMES, HUDDERSFIELD."

Improved PATENT SCRUBBER-WASHERS, All sizes, From 50,000 to 5,000,000 Cubic Feet of Gas per day. Results unrivalled. Send for Particulars and Prices.

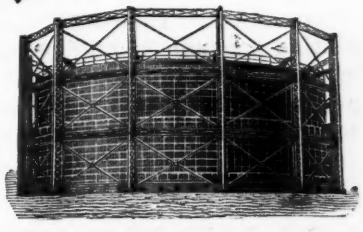
MALLEABLE and all Kinds of CASTINGS.



GASHOLDERS of Improved Construction and of all Sizes. ROOFS, BRIDGES, TANKS, GIRDERS.

Improved BYE-PASS and CENTRE-VALVES, GOVERNORS, and METERS.

Rotary or Pump EXHAUSTERS.



80, CANNON STREET, LONDON,

AND

WHITESTONE IRON WORKS, HUDDERSFIELD.

IMPROVEMENTS IN STREET LIGHTING.

Highest Efficiency with Greatest Economy.

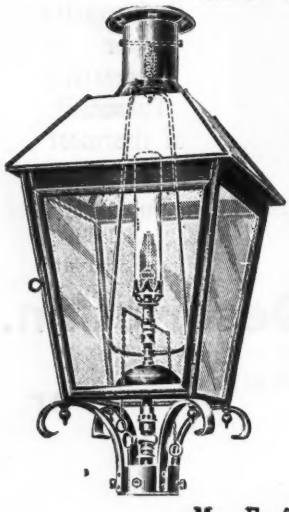
LIGHTING AUTHORITIES, GAS ENGINEERS, and GAS MANAGERS

are invited to inspect the

INCANDESCENT GAS-LIGHT

(Welsbach System),

which has now been successfully adapted to the purposes of

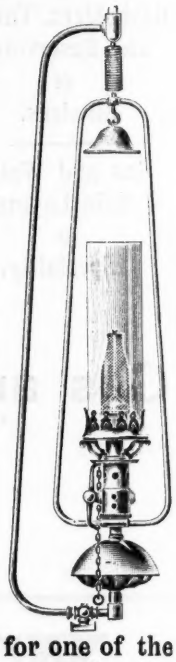


STREET LIGHTING,

the difficulties caused by VIBRATION having been OVERCOME by the use of the

NEW SPRING SUSPENSION FRAME (Patent).

This System of Lighting meets the requirements of all Lighting Authorities in those Districts where it is desired to effect an Improvement in Street Lighting WITHOUT INCREASE OF EXPENDITURE.



The following are Extracts from a PAPER read by Mr. F. G. DEXTER, before the SOUTHERN DISTRICT ASSOCIATION.

"The success of the experimental (Welsbach) lighting secured the contract for one of the Parish Council Districts; and this was shortly followed by the contract for three years for the city lamps. The total represents altogether about 500 single lamps, and 15 refuge lamps containing two lights."

"In the matter of maintenance of the street lights, the record is favourable—in fact, more so than the estimate provided. By the test-meter, the average daily consumption works out to 38 cubic feet per light, including bye-pass. The bye-pass consumes with a flame half an inch long, $\frac{1}{5}$ foot per hour. This represents 1000 cubic feet per lamp per annum. The average consumption per light, when in use, works out to 12,900 feet per annum, or about $3\frac{3}{5}$ feet per light per hour. The lighting is continued all the year round, from the average times of one hour after sunset to one hour before sunrise."

"The mantles have worked out to an average of three per lamp per annum; but, bearing in mind the absence of frost last winter, the writer believes that four mantles per light is more likely to represent average conditions."

"In the matter of cleaning, it may be said that the lanterns require less attention than with the ordinary flat-flame burner."

"The number of lights attended to per man averages 85."

"The 'Welsbach' Light is undoubtedly one of the greatest aids to successful competition that the Gas Industry has ever experienced. Its influence, while reducing the relative cost of light, has advanced the consumption of gas all over the country by the increased satisfaction of the existing consumers, and the attraction of others. The writer feels that its influence should not be confined to the house. It is capable of meeting every competitor in the street, from cheap oils to arc lights, in cost and in effect; and it is hoped that the foregoing experience may lead many others to seek its aid and to realize its efficiency."

FOR PRICES AND PARTICULARS, APPLY TO THE

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Glasgow	300,000 ,,	Bath	1,000,000 ,,
Brussels	700,000 ,,	New York	1,200,000 ,,
Liverpool	3,500,000 ,,	Newburgh, N.Y.	350,000 ,,
Tottenham	750,000 ,,	Tottenham (Second Contract)	750,000 ,,
Santiago	400,000 ,,	St. Joseph, Mo.	750,000 ,,
Swansea	750,000 ,,	Brussels (Second Contract)	700,000 ,,
Brighton	1,500,000 ,,	Winchester	200,000 ,,
		Hoylake	125,000 ,,

And have now under Contract:—

Belfast (Second Contract)	4,500,000 Cub. Ft.	Norwich	1,000,000 Cub. Ft.
Shanghai	225,000 ,,	Guildford	350,000 ,,
Manchester	3,000,000 ,,	Syracuse, N.Y.	850,000 ,,
Holyoke, Mass.	600,000 ,,	Bordentown, N.J.	125,000 ,,
Edinburgh	2,000,000 ,,	Lea Bridge	350,000 ,,
Stockton-on-Tees	500,000 ,,	Newburgh, N.Y. (Second Contract)	250,000 ,,
Stockport	500,000 ,,	Coventry	600,000 ,,

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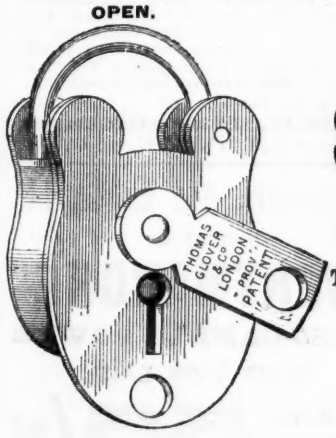

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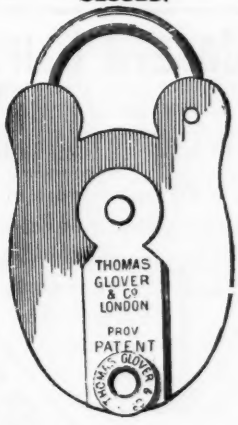

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[See Illustrated Advertisement, Dec. 1, p. 1096.]

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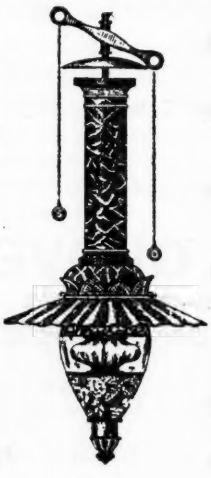

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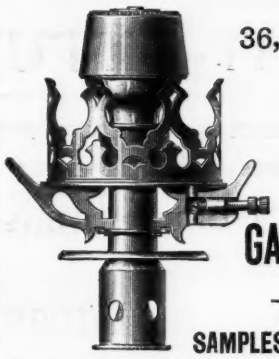

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[See Illustrated Advertisement, Dec. 1, p. 1051.]

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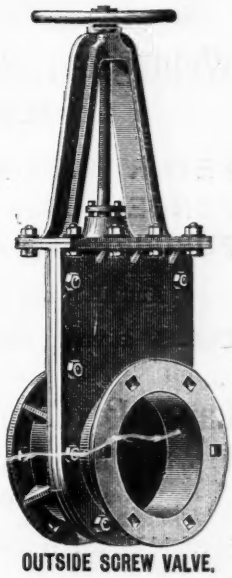

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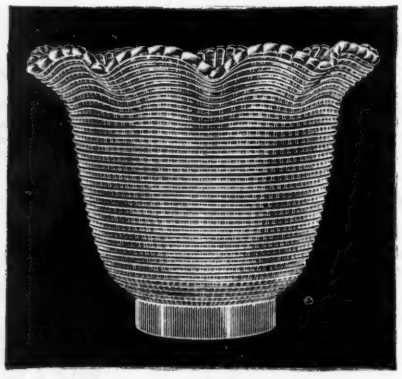

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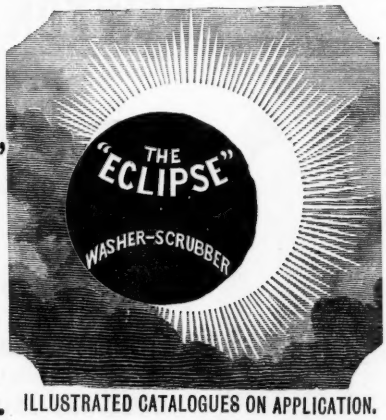

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